

```

<?xml version="1.0" encoding="UTF-8" ?>
<sbml xmlns="http://www.sbml.org/sbml/level2" level="2" version="1">
  <model id="iBsu1147" name="iBsu1147">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>COBRA_Toolbox</p></html>
    </notes>
    <listOfSpecies>
      <species id="M_C00001_c" name="H2O|Water|HO-|OH-|h2o" compartment="C_c">
        <notes>
          <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: H2O</p></html>
        </notes>
      </species>
      <species id="M_C00001_e" name="H2O|Water|HO-|OH-|h2o, extracellular"
        compartment="C_e">
        <notes>
          <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: H2O,
extracellular</p></html>
        </notes>
      </species>
      <species id="M_C00002_c" name="ATP|Adenosine 5'-triphosphate|atp"
        compartment="C_c">
        <notes>
          <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H13N5O13P3</p></html>
        </notes>
      </species>
      <species id="M_C00003_c" name="NAD+|NAD|Nicotinamide adenine
        dinucleotide|DPN|Diphosphopyridine nucleotide|Nadide|Nicotinamideadeninedinucleotide|nad"
        compartment="C_c">
        <notes>
          <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C21H26N7O14P2</p></html>
        </notes>
      </species>
      <species id="M_C00004_c" name="NADH|DPNH|Nicotinamide adenine dinucleotide -
        reduced|Nicotinamideadeninedinucleotide-reduced|nadh" compartment="C_c">
        <notes>
          <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C21H27N7O14P2</p></html>
        </notes>
      </species>
      <species id="M_C00005_c" name="NADPH|TPNH|Nicotinamide adenine dinucleotide
        phosphate - reduced|Nicotinamideadeninedinucleotidephosphate-reduced|nadph"
        compartment="C_c">

```

```

    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C21H27N7O17P3</p></html>
    </notes>
  </species>
  <species id="M_C00006_c" name="NADP+|NADP|Nicotinamide adenine dinucleotide
phosphate|beta-Nicotinamide adenine dinucleotide phosphate|TPN|Triphosphopyridine
nucleotide|Nicotinamide adenine dinucleotide phosphate
-[Nicotinamideadeninedinucleotidephosphate|nadp" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C21H26N7O17P3</p></html>
    </notes>
  </species>
  <species id="M_C00007_c" name="Oxygen|O2|o2|dioxygen" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: O2</p></html>
    </notes>
  </species>
  <species id="M_C00007_e" name="Oxygen|O2|o2|dioxygen, extracellular"
compartment="C_e">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: O2,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00008_c" name="ADP|Adenosine 5'-diphosphate|adp"
compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H13N5O10P2</p></html>
    </notes>
  </species>
  <species id="M_C00009_c" name="Orthophosphate|Phosphate|Phosphoric
acid|Orthophosphoric acid|phosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: HO4P</p></html>
    </notes>
  </species>
  <species id="M_C00009_e" name="Orthophosphate|Phosphate|Phosphoric
acid|Orthophosphoric acid|phosphate, extracellular" compartment="C_e">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: HO4P,
extracellular</p></html>

```

```

    </notes>
</species>
  <species id="M_C00010_c" name="CoA|Coenzyme A|CoA-SH|CoenzymeA|coA|coenzyme
a" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C21H33N7O16P3S</p></html>
    </notes>
</species>
  <species id="M_C00011_c" name="CO2|Carbon dioxide|co2" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: CO2</p></html>
    </notes>
</species>
  <species id="M_C00011_e" name="CO2|Carbon dioxide|co2, extracellular"
compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: CO2,
extracellular</p></html>
    </notes>
</species>
  <species id="M_C00013_c" name="Pyrophosphate|Pyrophosphoric
acid|Diphosphate|PPi|diphosphate|pyrophosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: H2O7P2</p></html>
    </notes>
</species>
  <species id="M_C00013_e" name="Pyrophosphate|Pyrophosphoric
acid|Diphosphate|PPi|diphosphate|pyrophosphate, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: H2O7P2,
extracellular</p></html>
    </notes>
</species>
  <species id="M_C00014_c" name="NH3|Ammonia|Ammonium|NH4+|NH4plus|nh4+"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: H4N</p></html>
    </notes>
</species>
  <species id="M_C00014_e" name="NH3|Ammonia|Ammonium|NH4+|NH4plus|nh4+,
extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: H4N,

```

extracellular</p></html>  
 </notes>  
</species>  
 <species id="M\_C00015\_c" name="UDP|Uridine 5'-diphosphate|udp" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C9H12N2O12P2</p></html>  
 </notes>  
</species>  
 <species id="M\_C00016\_c" name="FAD|Flavin adenine dinucleotide|Flavin adenine  
 dinucleotide oxidized|Flavinadeninedinucleotideoxidized|fad" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C27H31N9O15P2</p></html>  
 </notes>  
</species>  
 <species id="M\_C00017\_c" name="Protein" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C4H5N2O3R2</p></html>  
 </notes>  
</species>  
 <species id="M\_C00019\_c"  
 name="S-Adenosyl-L-methionine|S-Adenosylmethionine|Acylcarnitine|S-adenosyl-L-methionine|  
 AdoMet|SAM|s-adenosyl-l-methionine" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C15H23N6O5S</p></html>  
 </notes>  
</species>  
 <species id="M\_C00020\_c" name="AMP|Adenosine 5'-monophosphate|Adenylic  
 acid|Adenylate|5'-AMP|5'-Adenylic acid|5'-Adenosine monophosphate|Adenosine  
 5'-phosphate|amp" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C10H13N5O7P</p></html>  
 </notes>  
</species>  
 <species id="M\_C00020\_e" name="AMP|Adenosine 5'-monophosphate|Adenylic  
 acid|Adenylate|5'-AMP|5'-Adenylic acid|5'-Adenosine monophosphate|Adenosine  
 5'-phosphate|amp, extracellular" compartment="C\_e">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H13N5O7P,  
 extracellular</p></html>

```

    </notes>
</species>
    <species id="M_C00021_c"
name="S-Adenosyl-L-homocysteine|S-Adenosylhomocysteine|S-adenosyl-L-homocysteine|s-adenosyl-homocysteine" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C14H20N6O5S</p></html>
    </notes>
</species>
    <species id="M_C00022_c" name="Pyruvate|Pyruvic acid|2-Oxopropanoate|2-Oxopropanoic acid|Pyroracemic acid|pyruvate" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H3O3</p></html>
    </notes>
</species>
    <species id="M_C00022_e" name="Pyruvate|Pyruvic acid|2-Oxopropanoate|2-Oxopropanoic acid|Pyroracemic acid|pyruvate, extracellular" compartment="C_e">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H3O3,
extracellular</p></html>
    </notes>
</species>
    <species id="M_C00024_c" name="Acetyl-CoA|Acetyl coenzyme A|acetyl-coA|acetyl-CoA|acetyl-coa" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C23H35N7O17P3S</p></html>
    </notes>
</species>
    <species id="M_C00025_c" name="L-Glutamate|L-Glutamic acid|L-Glutaminic acid|L-glutamate|GLU|Glutamate|l-glutamate|Glutaminic acid|2-Aminoglutaric acid|glutamate|DL-Glutamate|DL-Glutaminic acid" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H8NO4</p></html>
    </notes>
</species>
    <species id="M_C00025_e" name="L-Glutamate|L-Glutamic acid|L-Glutaminic acid|L-glutamate|GLU|Glutamate|l-glutamate|Glutaminic acid|2-Aminoglutaric acid|glutamate|DL-Glutamate|DL-Glutaminic acid, extracellular" compartment="C_e">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H8NO4,
extracellular</p></html>
    </notes>

```

```

</species>
  <species id="M_C00026_c" name="2-Oxoglutarate|Oxoglutaric acid|2-Ketoglutaric
acid|alpha-Ketoglutaric acid|2-oxoglutarate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H4O5</p></html>
    </notes>
  </species>
  <species id="M_C00026_e" name="2-Oxoglutarate|Oxoglutaric acid|2-Ketoglutaric
acid|alpha-Ketoglutaric acid|2-oxoglutarate, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H4O5,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00027_c" name="H2O2|Hydrogen
peroxide|Oxydol|Hydrogenperoxide|h2o2" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: H2O2</p></html>
    </notes>
  </species>
  <species id="M_C00029_c" name="UDP-glucose|UDPglucose|UDP-D-glucose|Uridine
diphosphate glucose|UDP-alpha-D-glucose|udp-d-glucose" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C15H22N2O17P2</p></html>
    </notes>
  </species>
  <species id="M_C00032_c" name="Heme|Haem|Protoheme|Heme B|Protoheme
IX|protoheme" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C34H30FeN4O4</p></html>
    </notes>
  </species>
  <species id="M_C00032_e" name="Heme|Haem|Protoheme|Heme B|Protoheme
IX|protoheme, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C34H30FeN4O4,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00033_c" name="Acetate|Acetic acid|Ethanoic acid|Glacial acetic
acid|acetate|ACET" compartment="C_c">
    <notes>

```

```

    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H3O2</p></html>
  </notes>
</species>
  <species id="M_C00033_e" name="Acetate|Acetic acid|Ethanoic acid|Glacial acetic
acid|acetate|ACET, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H3O2,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00034_c" name="Manganese|Mn2+|Mn(II)|Mn(III)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Mn</p></html>
    </notes>
  </species>
  <species id="M_C00034_e" name="Manganese|Mn2+|Mn(II)|Mn(III), extracellular"
compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Mn,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00035_c" name="GDP|Guanosine 5'-diphosphate|Guanosine
diphosphate|gdp" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H13N5O11P2</p></html>
    </notes>
  </species>
  <species id="M_C00036_c" name="Oxaloacetate|Oxalacetic acid|Oxaloacetic
acid|2-Oxobutanedioic acid|Oxosuccinic acid|keto-Oxaloacetate|oxaloacetate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H2O5</p></html>
    </notes>
  </species>
  <species id="M_C00037_c" name="Glycine|Aminoacetic acid|Gly|glycine"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H5NO2</p></html>
    </notes>
  </species>
  <species id="M_C00037_e" name="Glycine|Aminoacetic acid|Gly|glycine, extracellular"
compartment="C_e">

```

```

    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C2H5NO2,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00038_c" name="Zinc|Zn2+|Zn(II)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Zn</p></html>
    </notes>
  </species>
  <species id="M_C00038_e" name="Zinc|Zn2+|Zn(II), extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      Zn,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00039_c"
name="DNA|DNAn|DNAn+1|(Deoxyribonucleotide)n|(Deoxyribonucleotide)m|(Deoxyribonucleo
tide)n+m|Deoxyribonucleic acid" compartment="C_c">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C15H23O13P2R3</p></html>
    </notes>
  </species>
  <species id="M_C00041_c"      name="L-Alanine|L-2-Aminopropionic
acid|L-alpha-Alanine|L-alanine|ALA|l-alanine" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H7NO2</p></html>
    </notes>
  </species>
  <species id="M_C00041_e"      name="L-Alanine|L-2-Aminopropionic
acid|L-alpha-Alanine|L-alanine|ALA|l-alanine, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C3H7NO2,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00042_c"      name="Succinate|Succinic      acid|Butanedionic
acid|Ethylenesuccinic acid|succinate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H4O4</p></html>
    </notes>
  </species>
  <species id="M_C00042_e"      name="Succinate|Succinic      acid|Butanedionic

```



acid|Ethylenesuccinic acid|succinate, extracellular" compartment="C\_e">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H4O4, extracellular</p></html>

</notes>

</species>

<species id="M\_C00043\_c" name="UDP-N-acetyl-D-glucosamine|UDP-N-acetylglucosamine|udp-n-acetyl-d-glucosamine" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C17H25N3O17P2</p></html>

</notes>

</species>

<species id="M\_C00044\_c" name="GTP|Guanosine 5'-triphosphate|gtp" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H13N5O14P3</p></html>

</notes>

</species>

<species id="M\_C00047\_c" name="L-Lysine|Lysine acid|2,6-Diaminohexanoic acid|L-lysine|Lysine|lysine|l-lysine" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H15N2O2</p></html>

</notes>

</species>

<species id="M\_C00047\_e" name="L-Lysine|Lysine acid|2,6-Diaminohexanoic acid|L-lysine|Lysine|lysine|l-lysine, extracellular" compartment="C\_e">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H15N2O2, extracellular</p></html>

</notes>

</species>

<species id="M\_C00048\_c" name="Glyoxylate|Glyoxalate|Glyoxylic acid|glyoxylate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2HO3</p></html>

</notes>

</species>

<species id="M\_C00048\_e" name="Glyoxylate|Glyoxalate|Glyoxylic acid|glyoxylate, extracellular" compartment="C\_e">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2HO3,

extracellular</p></html>  
 </notes>  
 </species>  
 <species id="M\_C00049\_c" name="L-Aspartate|L-Aspartic acid|2-Aminosuccinic acid|L-aspartate|Aspartate|Aspartic acid|aspartate|l-aspartate" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H6NO4</p></html>  
 </notes>  
 </species>  
 <species id="M\_C00049\_e" name="L-Aspartate|L-Aspartic acid|2-Aminosuccinic acid|L-aspartate|Aspartate|Aspartic acid|aspartate|l-aspartate, extracellular" compartment="C\_e">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H6NO4, extracellular</p></html>  
 </notes>  
 </species>  
 <species id="M\_C00051\_c" name="Glutathione|Reduced glutathione|5-L-Glutamyl-L-cysteinylglycine|N-(N-gamma-L-Glutamyl-L-cysteinyl)glycine|gamma-L-Glutamyl-L-cysteinyl-glycine|GSH|Reducedglutathione|glutathione|reduced glutathione" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H16N3O6S</p></html>  
 </notes>  
 </species>  
 <species id="M\_C00052\_c" name="UDP-D-galactose|UDP-galactose|UDP-D-galactopyranose|UDPgalactose|udp-galactose" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C15H22N2O17P2</p></html>  
 </notes>  
 </species>  
 <species id="M\_C00053\_c" name="3'-Phosphoadenylyl sulfate|3'-Phosphoadenosine 5'-phosphosulfate|3'-Phospho-5'-adenylyl sulfate|PAPS|3-Phosphoadenylylsulfate|3-phospho-adenylylsulfate|3-phosphoadenylyl sulfate" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H12N5O13P2S</p></html>  
 </notes>  
 </species>  
 <species id="M\_C00054\_c" name="Adenosine 3',5'-bisphosphate|PAP|3'-Phosphoadenylate|Phosphoadenosine phosphate|adenosine

```

3',5'-bisphosphate|Adenosine3-5-bisphosphate" compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H13N5O10P2</p></html>
    </notes>
</species>
<species id="M_C00055_c" name="CMP|Cytidine-5'-monophosphate|Cytidylic acid|cmp"
compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H13N3O8P</p></html>
    </notes>
</species>
<species id="M_C00055_e" name="CMP|Cytidine-5'-monophosphate|Cytidylic acid|cmp,
extracellular" compartment="C_e">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C9H13N3O8P,
extracellular</p></html>
    </notes>
</species>
<species id="M_C00058_c" name="Formate|Methanoic acid|Formic acid|formate|FORM"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: CHO2</p></html>
    </notes>
</species>
<species id="M_C00058_e" name="Formate|Methanoic acid|Formic acid|formate|FORM,
extracellular" compartment="C_e">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      CHO2,
extracellular</p></html>
    </notes>
</species>
<species id="M_C00059_c" name="Sulfate|Sulfuric acid|sulfate|SLF" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: O4S</p></html>
    </notes>
</species>
<species id="M_C00059_e" name="Sulfate|Sulfuric acid|sulfate|SLF, extracellular"
compartment="C_e">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      O4S,
extracellular</p></html>
    </notes>

```

```

</species>
  <species id="M_C00061_c" name="FMN|Riboflavin-5-phosphate|Flavin
mononucleotide|flavin mononucleotide|fmn" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C17H20N4O9P</p></html>
    </notes>
</species>
  <species id="M_C00062_c" name="L-Arginine|(S)-2-Amino-5-guanidinovaleric
acid|L-arginine|l-arginine" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H15N4O2</p></html>
    </notes>
</species>
  <species id="M_C00062_e" name="L-Arginine|(S)-2-Amino-5-guanidinovaleric
acid|L-arginine|l-arginine, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H15N4O2,
extracellular</p></html>
    </notes>
</species>
  <species id="M_C00063_c" name="CTP|Cytidine 5'-triphosphate|Cytidine triphosphate|ctp"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H13N3O14P3</p></html>
    </notes>
</species>
  <species id="M_C00064_c" name="L-Glutamine|L-2-Aminoglutaramic
acid|L-glutamine|l-glutamine" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10N2O3</p></html>
    </notes>
</species>
  <species id="M_C00064_e" name="L-Glutamine|L-2-Aminoglutaramic
acid|L-glutamine|l-glutamine, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10N2O3,
extracellular</p></html>
    </notes>
</species>
  <species id="M_C00065_c" name="L-Serine|L-2-Amino-3-hydroxypropionic
acid|L-3-Hydroxy-alanine|L-serine|Serine|l-serine|2-Amino-3-hydroxypropionic
acid|3-Hydroxyalanine|serine|DL-Serine" compartment="C_c">

```

```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H7NO3</p></html>
    </notes>
  </species>
  <species id="M_C00065_e" name="L-Serine|L-2-Amino-3-hydroxypropionic
acid|L-3-Hydroxy-alanine|L-serine|Serine|l-serine|2-Amino-3-hydroxypropionic
acid|3-Hydroxyalanine|serine|DL-Serine, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H7NO3,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00067_c"
name="Formaldehyde|Methanal|Oxomethane|Oxomethylene|Methylene
oxide|Formalin|formaldehyde" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: CH2O</p></html>
    </notes>
  </species>
  <species id="M_C00068_c" name="Thiamin diphosphate|Thiamine diphosphate|Thiamin
pyrophosphate|TPP|ThPP|Thiaminediphosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C12H17N4O7P2S</p></html>
    </notes>
  </species>
  <species id="M_C00070_c"
name="Copper2|Cu2+|Cu(II)|Cu(II)|Copper1|Cu1+|Cu(I)|Cu+|Copper" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Cu</p></html>
    </notes>
  </species>
  <species id="M_C00070_e"
name="Copper2|Cu2+|Cu(II)|Cu(II)|Copper1|Cu1+|Cu(I)|Cu+|Copper,
extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Cu,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00073_c" name="L-Methionine|Methionine|L-2-Amino-4methylthiobutyric
acid|2-Amino-4-(methylthio)butyric acid|L-methionine|methionine|l-methionine"
compartment="C_c">
    <notes>

```

```

    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H11NO2S</p></html>
  </notes>
</species>
  <species id="M_C00073_e" name="L-Methionine|Methionine|L-2-Amino-4methylthiobutyric
acid|2-Amino-4-(methylthio)butyric acid|L-methionine|methionine|l-methionine, extracellular"
compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H11NO2S,
extracellular</p></html>
  </notes>
</species>
  <species id="M_C00074_c" name="Phosphoenolpyruvate|Phosphoenolpyruvic
acid|PEP|phosphoenolpyruvate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H3O6P</p></html>
  </notes>
</species>
  <species id="M_C00074_e" name="Phosphoenolpyruvate|Phosphoenolpyruvic
acid|PEP|phosphoenolpyruvate, extracellular" compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H3O6P,
extracellular</p></html>
  </notes>
</species>
  <species id="M_C00075_c" name="UTP|Uridine 5'-triphosphate|Uridine triphosphate|utp"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H12N2O15P3</p></html>
  </notes>
</species>
  <species id="M_C00076_c" name="Calcium|Ca2+|Ca(2+)" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Ca</p></html>
  </notes>
</species>
  <species id="M_C00076_e" name="Calcium|Ca2+|Ca(2+), extracellular"
compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Ca,
extracellular</p></html>
  </notes>
</species>
  <species id="M_C00077_c" name="L-Ornithine|(S)-2,5-Diaminovaleric

```

acid|(S)-2,5-Diaminopentanoic acid|(S)-2,5-Diaminopentanoate|Ornithine|2,5-Diaminovaleric acid|2,5-Diaminopentanoic acid|2,5-Diaminopentanoate|L-ornithine|ornithine|l-ornithine" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H13N2O2</p></html>

</notes>

</species>

<species id="M\_C00077\_e" name="L-Ornithine|(S)-2,5-Diaminovaleric acid|(S)-2,5-Diaminopentanoic acid|(S)-2,5-Diaminopentanoate|Ornithine|2,5-Diaminovaleric acid|2,5-Diaminopentanoic acid|2,5-Diaminopentanoate|L-ornithine|ornithine|l-ornithine, extracellular" compartment="C\_e">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H13N2O2, extracellular</p></html>

</notes>

</species>

<species id="M\_C00078\_c" name="L-Tryptophan|Tryptophan|(S)-alpha-Amino-beta-(3-indolyl)-propionic acid|alpha-Amino-beta-(3-indolyl)-propionic acid|L-tryptophan|tryptophan|l-tryptophan" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C11H12N2O2</p></html>

</notes>

</species>

<species id="M\_C00078\_e" name="L-Tryptophan|Tryptophan|(S)-alpha-Amino-beta-(3-indolyl)-propionic acid|alpha-Amino-beta-(3-indolyl)-propionic acid|L-tryptophan|tryptophan|l-tryptophan, extracellular" compartment="C\_e">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C11H12N2O2, extracellular</p></html>

</notes>

</species>

<species id="M\_C00079\_c" name="L-Phenylalanine|(S)-alpha-Amino-beta-phenylpropionic acid|L-phenylalanine|l-phenylalanine" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H11NO2</p></html>

</notes>

</species>

<species id="M\_C00079\_e" name="L-Phenylalanine|(S)-alpha-Amino-beta-phenylpropionic acid|L-phenylalanine|l-phenylalanine, extracellular" compartment="C\_e">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H11NO2,

```

extracellular</p></html>
  </notes>
</species>
  <species id="M_C00080_c" name="H+|h+" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: H</p></html>
    </notes>
  </species>
  <species id="M_C00080_e" name="H+|h+, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: H,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00081_c" name="ITP|Inosine 5'-triphosphate|Inosine triphosphate|Inosine
tripolyphosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H12N4O14P3</p></html>
    </notes>
  </species>
  <species id="M_C00082_c"
name="L-Tyrosine|(S)-3-(p-Hydroxyphenyl)alanine|(S)-2-Amino-3-(p-hydroxyphenyl)propionic
acid|L-tyrosine|Tyrosine|l-tyrosine|3-(p-Hydroxyphenyl)alanine|2-Amino-3-(p-hydroxyphenyl)pro
pionic acid|tyrosine|DL-Tyrosine" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H11NO3</p></html>
    </notes>
  </species>
  <species id="M_C00082_e"
name="L-Tyrosine|(S)-3-(p-Hydroxyphenyl)alanine|(S)-2-Amino-3-(p-hydroxyphenyl)propionic
acid|L-tyrosine|Tyrosine|l-tyrosine|3-(p-Hydroxyphenyl)alanine|2-Amino-3-(p-hydroxyphenyl)pro
pionic acid|tyrosine|DL-Tyrosine, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H11NO3,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00083_c" name="Malonyl-CoA|Malonyl coenzyme
A|malonyl-CoA|malonyl-coa" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C24H34N7O19P3S</p></html>
    </notes>

```



```

</species>
  <species id="M_C00084_c" name="Acetaldehyde|Ethanal|acetaldehyde|AALD"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H4O</p></html>
  </notes>
</species>
  <species id="M_C00086_c" name="Urea|Carbamide|urea" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: CH4N2O</p></html>
  </notes>
</species>
  <species id="M_C00086_e" name="Urea|Carbamide|urea, extracellular"
compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: CH4N2O,
extracellular</p></html>
  </notes>
</species>
  <species id="M_C00087_c" name="Sulfur|S|Sulfur, precipitated" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: S</p></html>
  </notes>
</species>
  <species id="M_C00088_c" name="Nitrite|nitrite" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: NO2</p></html>
  </notes>
</species>
  <species id="M_C00088_e" name="Nitrite|nitrite, extracellular" compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: NO2,
extracellular</p></html>
  </notes>
</species>
  <species id="M_C00089_c" name="Sucrose|Cane
sugar|Saccharose|1-alpha-D-Glucopyranosyl-2-beta-D-fructofuranoside|sucrose|SUCR"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C12H22O11</p></html>
  </notes>
</species>
  <species id="M_C00089_e" name="Sucrose|Cane
sugar|Saccharose|1-alpha-D-Glucopyranosyl-2-beta-D-fructofuranoside|sucrose|SUCR,

```

```

extracellular" compartment="C_e">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C12H22O11,
extracellular</p></html>
  </notes>
</species>
  <species      id="M_C00090_c"
name="Catechol|1,2-Benzenediol|o-Benzenediol|1,2-Dihydroxybenzene|Brenzcatechin|Pyrocatech
ol|catechol" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H6O2</p></html>
  </notes>
</species>
  <species      id="M_C00091_c"      name="Succinyl-CoA|Succinyl      coenzyme
A|succinyl-CoA|succinyl-coa" compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C25H36N7O19P3S</p></html>
  </notes>
</species>
  <species      id="M_C00093_c"      name="sn-Glycerol      3-phosphate|Glycerophosphoric
acid|sn-Gro-1-P|Glycerol-3-phosphate|Glycerol
3-phosphate|Glycerol3-phosphate|glycerol-3-phosphate|glycerol
3-phosphate|GLYC-3-P|D-Glycerol      1-phosphate|Glycerol      1-phosphate|sn-Glycerol
1-phosphate|L-Glycerol 1-phosphate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H8O6P</p></html>
  </notes>
</species>
  <species      id="M_C00093_e"      name="sn-Glycerol      3-phosphate|Glycerophosphoric
acid|sn-Gro-1-P|Glycerol-3-phosphate|Glycerol
3-phosphate|Glycerol3-phosphate|glycerol-3-phosphate|glycerol
3-phosphate|GLYC-3-P|D-Glycerol      1-phosphate|Glycerol      1-phosphate|sn-Glycerol
1-phosphate|L-Glycerol 1-phosphate, extracellular" compartment="C_e">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C3H8O6P,
extracellular</p></html>
  </notes>
</species>
  <species      id="M_C00095_c"      name="D-Fructose|Levulose|Fruit
sugar|D-arabino-Hexulose|beta-D-Fructose|beta-Fruit
sugar|beta-D-arabino-Hexulose|beta-Levulose|Fructose|arabino-Hexulose|D-fructose|fructose"
compartment="C_c">
  <notes>

```

```

    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O6</p></html>
  </notes>
</species>
  <species          id="M_C00095_e"          name="D-Fructose|Levulose|Fruit
sugar|D-arabino-Hexulose|beta-D-Fructose|beta-Fruit
sugar|beta-D-arabino-Hexulose|beta-Levulose|Fructose|arabino-Hexulose|D-fructose|fructose,
extracellular" compartment="C_e">
    <notes>
      <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          C6H12O6,
extracellular</p></html>
    </notes>
</species>
  <species          id="M_C00097_c"          name="L-Cysteine|L-2-Amino-3-mercaptopropionic
acid|L-cysteine|l-cysteine" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H7NO2S</p></html>
    </notes>
</species>
  <species          id="M_C00097_e"          name="L-Cysteine|L-2-Amino-3-mercaptopropionic
acid|L-cysteine|l-cysteine, extracellular" compartment="C_e">
    <notes>
      <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          C3H7NO2S,
extracellular</p></html>
    </notes>
</species>
  <species          id="M_C00099_c"          name="beta-Alanine|3-Aminopropionic
acid|3-Aminopropanoate|beta-alanine" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H7NO2</p></html>
    </notes>
</species>
  <species          id="M_C00099_e"          name="beta-Alanine|3-Aminopropionic
acid|3-Aminopropanoate|beta-alanine, extracellular" compartment="C_e">
    <notes>
      <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          C3H7NO2,
extracellular</p></html>
    </notes>
</species>
  <species          id="M_C00100_c"          name="Propanoyl-CoA|Propionyl-CoA|Propionyl coenzyme
A|propionyl-CoA|propionyl-coa" compartment="C_c">
    <notes>
      <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C24H37N7O17P3S</p></html>
    </notes>

```

```

</species>
  <species id="M_C00101_c" name="Tetrahydrofolate|5,6,7,8-Tetrahydrofolate|Tetrahydrofolic
acid|THF|(6S)-Tetrahydrofolate|(6S)-Tetrahydrofolic
acid|(6S)-THFA|tetrahydrofolate|5-6-7-8-Tetrahydrofolate|thf" compartment="C_c">
    <notes>
      <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C19H21N7O6</p></html>
    </notes>
</species>
  <species      id="M_C00103_c"      name="D-Glucose      1-phosphate|alpha-D-Glucose
1-phosphate|Cori                                  ester|D-Glucose
alpha-1-phosphate|alpha-D-Glucose-1-phosphate|D-Glucose 1-phosphate|alpha-D-glucose-1-phosp
hate|D-glucose-1-phosphate|D-glucose 1-phosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O9P</p></html>
    </notes>
</species>
  <species      id="M_C00103_e"      name="D-Glucose      1-phosphate|alpha-D-Glucose
1-phosphate|Cori                                  ester|D-Glucose
alpha-1-phosphate|alpha-D-Glucose-1-phosphate|D-Glucose 1-phosphate|alpha-D-glucose-1-phosp
hate|D-glucose-1-phosphate|D-glucose 1-phosphate, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C6H12O9P,
extracellular</p></html>
    </notes>
</species>
  <species id="M_C00104_c" name="IDP|Inosine 5'-diphosphate|Inosine diphosphate"
compartment="C_c">
    <notes>
      <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H12N4O11P2</p></html>
    </notes>
</species>
  <species id="M_C00105_c" name="UMP|Uridylic acid|Uridine monophosphate|Uridine
5'-monophosphate|5'Uridylic acid|ump" compartment="C_c">
    <notes>
      <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H12N2O9P</p></html>
    </notes>
</species>
  <species id="M_C00105_e" name="UMP|Uridylic acid|Uridine monophosphate|Uridine
5'-monophosphate|5'Uridylic acid|ump, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C9H12N2O9P,

```

extracellular</p></html>  
 </notes>  
</species>  
 <species id="M\_C00106\_c" name="Uracil|uracil" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H4N2O2</p></html>  
 </notes>  
</species>  
 <species id="M\_C00106\_e" name="Uracil|uracil, extracellular" compartment="C\_e">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H4N2O2, extracellular</p></html>  
 </notes>  
</species>  
 <species id="M\_C00108\_c" name="Anthranilate|Anthranilic acid|o-Aminobenzoic acid|Vitamin L1|2-Aminobenzoate|anthranilate|2-aminobenzoate" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H6NO2</p></html>  
 </notes>  
</species>  
 <species id="M\_C00109\_c" name="2-Oxobutanoate|2-Ketobutyric acid|2-Oxobutyric acid|2-Oxobutyrate|2-Oxobutanoic acid|alpha-Ketobutyric acid|alpha-Ketobutyrate|2-oxobutanoate" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H5O3</p></html>  
 </notes>  
</species>  
 <species id="M\_C00111\_c" name="Glycerone phosphate|Dihydroxyacetone phosphate|Dihydroxyacetonephosphate|glycerone-phosphate|glycerone phosphate|dihydroxy-acetone-phosphate" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H6O6P</p></html>  
 </notes>  
</species>  
 <species id="M\_C00112\_c" name="CDP|Cytidine 5'-diphosphate|Cytidine diphosphate|cdp" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H13N3O11P2</p></html>  
 </notes>  
</species>  
 <species id="M\_C00114\_c" name="Choline|Bileneurine|choline" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H14NO</p></html>

```

    </notes>
</species>
    <species      id="M_C00114_e"      name="Choline|Bileneurine|choline,      extracellular"
compartment="C_e">
    <notes>
        <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C5H14NO,
extracellular</p></html>
    </notes>
</species>
    <species      id="M_C00116_c"
name="Glycerol|Glycerin|1,2,3-Trihydroxypropane|1,2,3-Propanetriol|glycerol|GLYC"
compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H8O3</p></html>
    </notes>
</species>
    <species      id="M_C00116_e"
name="Glycerol|Glycerin|1,2,3-Trihydroxypropane|1,2,3-Propanetriol|glycerol|GLYC,
extracellular" compartment="C_e">
    <notes>
        <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C3H8O3,
extracellular</p></html>
    </notes>
</species>
    <species      id="M_C00117_c"      name="D-Ribose      5-phosphate|Ribose
5-phosphate|alpha-D-Ribose
5-phosphate|alpha-D-Ribose5-phosphate|D-ribose-5-phosphate|D-ribose
5-phosphate|ribose-5-phosphate" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O8P</p></html>
    </notes>
</species>
    <species      id="M_C00118_c"
name="(2R)-2-Hydroxy-3-(phosphonoxy)-propanal|D-Glyceraldehyde
3-phosphate|Glyceraldehyde
3-phosphate|Glyceraldehyde3-phosphate|D-glyceraldehyde-3-phosphate|D-glyceraldehyde
3-phosphate|Glyceraldehyde-3-phosphate|glyceraldehyde-3-phosphate" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H6O6P</p></html>
    </notes>
</species>
    <species      id="M_C00119_c"      name="5-Phospho-alpha-D-ribose
1-diphosphate|5-Phosphoribosyl      diphosphate|5-Phosphoribosyl
1-pyrophosphate|PRPP|5-Phospho-alpha-D-ribose 1-diphosphate|5-phosphoribosyl-1-pyrophosphat

```

```

e|5-phospho-alpha-D-ribose 1-diphosphate|prpp" compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C5H10O14P3</p></html>
    </notes>
</species>
<species id="M_C00120_c" name="Biotin|D-Biotin|Vitamin H|Coenzyme R|BIOT|biotin"
compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H15N2O3S</p></html>
    </notes>
</species>
<species id="M_C00120_e" name="Biotin|D-Biotin|Vitamin H|Coenzyme R|BIOT|biotin,
extracellular" compartment="C_e">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H15N2O3S,
extracellular</p></html>
    </notes>
</species>
<species id="M_C00121_c" name="D-Ribose|D-ribose" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O5</p></html>
    </notes>
</species>
<species id="M_C00121_e" name="D-Ribose|D-ribose, extracellular" compartment="C_e">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O5,
extracellular</p></html>
    </notes>
</species>
<species id="M_C00122_c" name="Fumarate|Fumaric acid|trans-Butenedioic acid|fumarate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H2O4</p></html>
    </notes>
</species>
<species id="M_C00122_e" name="Fumarate|Fumaric acid|trans-Butenedioic acid|fumarate,
extracellular" compartment="C_e">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H2O4,
extracellular</p></html>
    </notes>
</species>

```

```

    <species          id="M_C00123_c"          name="L-Leucine|2-Amino-4-methylvaleric
acid|(2S)-alpha-2-Amino-4-methylvaleric          acid|(2S)-alpha-Leucine|L-leucine|l-leucine"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H13NO2</p></html>
    </notes>
</species>
    <species          id="M_C00123_e"          name="L-Leucine|2-Amino-4-methylvaleric
acid|(2S)-alpha-2-Amino-4-methylvaleric          acid|(2S)-alpha-Leucine|L-leucine|l-leucine,
extracellular" compartment="C_e">
    <notes>
    <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          C6H13NO2,
extracellular</p></html>
    </notes>
</species>
    <species id="M_C00124_c" name="D-Galactose|D-galactose|GALC" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O6</p></html>
    </notes>
</species>
    <species id="M_C00124_e" name="D-Galactose|D-galactose|GALC, extracellular"
compartment="C_e">
    <notes>
    <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          C6H12O6,
extracellular</p></html>
    </notes>
</species>
    <species id="M_C00125_c" name="Ferricytochrome c|Cytochrome c3+"
compartment="C_c">
    <notes>
    <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C42H52FeN8O6S2</p></html>
    </notes>
</species>
    <species id="M_C00126_c" name="Ferrocyclochrome c|Cytochrome c2+|Reduced cytochrome
c" compartment="C_c">
    <notes>
    <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C42H52FeN8O6S2</p></html>
    </notes>
</species>
    <species id="M_C00127_c" name="Glutathione disulfide|GSSG|Oxiglutathione|Oxidized
glutathione|oxidized glutathione|Oxidized glutathione glucose substituted" compartment="C_c">
    <notes>

```



```

    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H30N6O12S2</p></html>
    </notes>
</species>
    <species id="M_C00128_c" name="CMP-N-acetylneuraminate" compartment="C_c">
    <notes>
    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H29N4O16P</p></html>
    </notes>
</species>
    <species id="M_C00129_c" name="Isopentenyl diphosphate|delta3-Isopentenyl
diphosphate|delta3-Methyl-3-butenyl diphosphate|Isopentenyl diphosphate|isopentenyl
diphosphate" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O7P2</p></html>
    </notes>
</species>
    <species id="M_C00130_c" name="IMP|Inosinic acid|Inosine monophosphate|Inosine
5'-monophosphate|Inosine 5'-phosphate|5'-Inosinate|5'-Inosinic acid|5'-Inosine
monophosphate|5'-IMP|imp" compartment="C_c">
    <notes>
    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H12N4O8P</p></html>
    </notes>
</species>
    <species id="M_C00131_c" name="dATP|2'-Deoxyadenosine 5'-triphosphate|Deoxyadenosine
5'-triphosphate|Deoxyadenosine triphosphate|datp" compartment="C_c">
    <notes>
    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H13N5O12P3</p></html>
    </notes>
</species>
    <species id="M_C00132_c" name="Methanol|Methyl alcohol" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: CH4O</p></html>
    </notes>
</species>
    <species id="M_C00133_c" name="D-Alanine|D-2-Aminopropionic
acid|D-Ala|D-alanine|d-alanine" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H7NO2</p></html>
    </notes>
</species>
    <species id="M_C00133_e" name="D-Alanine|D-2-Aminopropionic

```

```

acid|D-Ala|D-alanine|d-alanine, extracellular" compartment="C_e">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C3H7NO2,
extracellular</p></html>
  </notes>
</species>
<species
  id="M_C00134_c"
name="Putrescine|1,4-Butanediamine|1,4-Diaminobutane|Tetramethylenediamine|putrescine|PUT
R" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H14N2</p></html>
  </notes>
</species>
<species
  id="M_C00134_e"
name="Putrescine|1,4-Butanediamine|1,4-Diaminobutane|Tetramethylenediamine|putrescine|PUT
R, extracellular" compartment="C_e">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C4H14N2,
extracellular</p></html>
  </notes>
</species>
<species id="M_C00135_c" name="L-Histidine|(S)-alpha-Amino-1H-imidazole-4-propionic
acid|L-histidine|l-histidine" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9N3O2</p></html>
  </notes>
</species>
<species id="M_C00135_e" name="L-Histidine|(S)-alpha-Amino-1H-imidazole-4-propionic
acid|L-histidine|l-histidine, extracellular" compartment="C_e">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C6H9N3O2,
extracellular</p></html>
  </notes>
</species>
<species id="M_C00136_c" name="Butanoyl-CoA|Butyryl-CoA|butanoyl-coa"
compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C25H39N7O17P3S</p></html>
  </notes>
</species>
<species
  id="M_C00137_c"
name="myo-Inositol|D-myo-Inositol|1D-myo-Inositol|L-myo-Inositol|1L-myo-Inositol|meso-Inosi
tol|Inositol|Dambosc|Cyclohexitol|Meat      sugar|Bios      I|L-Inositol|(-)-Inositol|inositol"

```

```

compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O6</p></html>
  </notes>
</species>
  <species id="M_C00137_e"
name="myo-Inositol|D-myo-Inositol|1D-myo-Inositol|L-myo-Inositol|1L-myo-Inositol|meso-Inosi
tol|Inositol|Dambosel|Cyclohexitol|Meat sugar|Bios I|L-Inositol|(-)-Inositol|inositol, extracellular"
compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O6,
extracellular</p></html>
  </notes>
</species>
  <species id="M_C00138_c" name="Reduced ferredoxin|Reducedferredoxin"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Fe2R4S6</p></html>
  </notes>
</species>
  <species id="M_C00139_c" name="Oxidized ferredoxin|Oxidizedferredoxin"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Fe2R4S6</p></html>
  </notes>
</species>
  <species id="M_C00140_c"
name="N-Acetyl-D-glucosamine|N-Acetylchitosamine|2-Acetamido-2-deoxy-D-glucose|GlcNAc"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H15NO6</p></html>
  </notes>
</species>
  <species id="M_C00140_e"
name="N-Acetyl-D-glucosamine|N-Acetylchitosamine|2-Acetamido-2-deoxy-D-glucose|GlcNAc,
extracellular" compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H15NO6,
extracellular</p></html>
  </notes>
</species>
  <species id="M_C00141_c" name="3-Methyl-2-oxobutanoic acid|3-Methyl-2-oxobutyric
acid|3-Methyl-2-oxobutanoate|2-Oxo-3-methylbutanoate|2-Oxoisovalerate|2-Oxoisopentanoate|alp
ha-Ketovaline|2-Ketovaline|2-Keto-3-methylbutyric

```

```

acid|3-methyl-2-oxobutanoate|3MOB|2-keto-isovalerate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H7O3</p></html>
  </notes>
</species>
<species id="M_C00143_c"
name="5,10-Methylenetetrahydrofolate|(6R)-5,10-Methylenetetrahydrofolate|5,10-Methylene-TH
F|5,10-methylenetetrahydrofolate|5-10-Methylenetetrahydrofolate|5,10-methylene-thf"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H21N7O6</p></html>
  </notes>
</species>
<species id="M_C00144_c" name="GMP|Guanosine 5'-phosphate|Guanosine
monophosphate|Guanosine 5'-monophosphate|Guanylic acid|gmp" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H13N5O8P</p></html>
  </notes>
</species>
<species id="M_C00144_e" name="GMP|Guanosine 5'-phosphate|Guanosine
monophosphate|Guanosine 5'-monophosphate|Guanylic acid|gmp, extracellular"
compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H13N5O8P,
extracellular</p></html>
  </notes>
</species>
<species id="M_C00147_c" name="Adenine|6-Aminopurine|adenine" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H5N5</p></html>
  </notes>
</species>
<species id="M_C00147_e" name="Adenine|6-Aminopurine|adenine, extracellular"
compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H5N5,
extracellular</p></html>
  </notes>
</species>
<species id="M_C00148_c" name="L-Proline|2-Pyrrolidinecarboxylic
acid|L-proline|l-proline" compartment="C_c">
  <notes>

```

```

    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H8NO2</p></html>
  </notes>
</species>
  <species id="M_C00148_e" name="L-Proline|2-Pyrrolidinecarboxylic acid|L-proline|l-proline,
extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H8NO2,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00149_c" name="(S)-Malate|L-Malate|L-Apple acid|L-Malic
acid|L-2-Hydroxybutanedioic acid|(S)-malate|MALA|Malate|Malic acid|2-Hydroxybutanedioic
acid|malate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H4O5</p></html>
    </notes>
  </species>
  <species id="M_C00149_e" name="(S)-Malate|L-Malate|L-Apple acid|L-Malic
acid|L-2-Hydroxybutanedioic acid|(S)-malate|MALA|Malate|Malic acid|2-Hydroxybutanedioic
acid|malate, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H4O5,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00152_c" name="L-Asparagine|2-Aminosuccinamic
acid|L-asparagine|l-asparagine" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H8N2O3</p></html>
    </notes>
  </species>
  <species id="M_C00152_e" name="L-Asparagine|2-Aminosuccinamic
acid|L-asparagine|l-asparagine, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H8N2O3,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00153_c" name="Nicotinamide|Nicotinic acid amide|Niacinamide|Vitamin
PP|nicotinamide|NICO|niacinamide" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H6N2O</p></html>
    </notes>
  </species>

```

<species id="M\_C00154\_c" name="Palmitoyl-CoA|Hexadecanoyl-CoA|Palmitoyl-CoA (n-C16:0CoA)|hexadecanoyl-coa" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C37H63N7O17P3S</p></html>

</notes>

</species>

<species id="M\_C00155\_c" name="L-Homocysteine|L-2-Amino-4-mercaptobutyric acid|L-homocysteine" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H9NO2S</p></html>

</notes>

</species>

<species id="M\_C00156\_c" name="4-Hydroxybenzoate|Hydroxybenzoic acid|4-Hydroxybenzoic acid|Hydroxybenzenecarboxylic acid" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H5O3</p></html>

</notes>

</species>

<species id="M\_C00158\_c" name="Citrate|Citric acid|2-Hydroxy-1,2,3-propanetricarboxylic acid|2-Hydroxytricarballic acid|citrate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H5O7</p></html>

</notes>

</species>

<species id="M\_C00158\_e" name="Citrate|Citric acid|2-Hydroxy-1,2,3-propanetricarboxylic acid|2-Hydroxytricarballic acid|citrate, extracellular" compartment="C\_e">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H5O7, extracellular</p></html>

</notes>

</species>

<species id="M\_C00159\_c" name="D-Mannose|Mannose|Seminose|Carubiose|D-mannose|mannose|MANN" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O6</p></html>

</notes>

</species>

<species id="M\_C00159\_e" name="D-Mannose|Mannose|Seminose|Carubiose|D-mannose|mannose|MANN, extracellular" compartment="C\_e">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O6,

extracellular</p></html>  
 </notes>  
</species>  
 <species id="M\_C00160\_c" name="Glycolate|Glycolic acid|Hydroxyacetic acid|glycolate"  
 compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H3O3</p></html>  
 </notes>  
</species>  
 <species id="M\_C00160\_e" name="Glycolate|Glycolic acid|Hydroxyacetic acid|glycolate,  
 extracellular" compartment="C\_e">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H3O3,  
 extracellular</p></html>  
 </notes>  
</species>  
 <species id="M\_C00163\_c" name="Propanoate|Propionate|Propanoic acid|Propionic  
 acid|Propionate (n-C3:0)|propionate" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H5O2</p></html>  
 </notes>  
</species>  
 <species id="M\_C00163\_e" name="Propanoate|Propionate|Propanoic acid|Propionic  
 acid|Propionate (n-C3:0)|propionate, extracellular" compartment="C\_e">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H5O2,  
 extracellular</p></html>  
 </notes>  
</species>  
 <species id="M\_C00164\_c" name="Acetoacetate|3-Oxobutanoic acid|beta-Ketobutyric  
 acid|Acetoacetic acid|acetoacetate" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H5O3</p></html>  
 </notes>  
</species>  
 <species id="M\_C00164\_e" name="Acetoacetate|3-Oxobutanoic acid|beta-Ketobutyric  
 acid|Acetoacetic acid|acetoacetate, extracellular" compartment="C\_e">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H5O3,  
 extracellular</p></html>  
 </notes>  
</species>  
 <species id="M\_C00166\_c" name="Phenylpyruvate|Phenylpyruvic  
 acid|alpha-Ketohydrocinnamic

acid|keto-Phenylpyruvate|3-Phenyl-2-oxopropanoate|phenylpyruvate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>9</sub>H<sub>7</sub>O<sub>3</sub></p></html>

</notes>

</species>

<species id="M\_C00167\_c" name="UDP-glucuronate|UDPglucuronate|UDP-D-glucuronate|UDP-alpha-D-glucuronate|udp-d-glucuronate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>15</sub>H<sub>19</sub>N<sub>2</sub>O<sub>18</sub>P<sub>2</sub></p></html>

</notes>

</species>

<species id="M\_C00168\_c" name="Hydroxypyruvate|Hydroxypyruvic acid|3-Hydroxypyruvate|3-Hydroxypyruvic acid|hydroxypyruvate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>3</sub>H<sub>3</sub>O<sub>4</sub></p></html>

</notes>

</species>

<species id="M\_C00169\_c" name="Carbamoyl phosphate|Carbamoylphosphate|carbamoyl-phosphate|carbamoyl phosphate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: CH<sub>3</sub>NO<sub>5</sub>P</p></html>

</notes>

</species>

<species id="M\_C00169\_e" name="Carbamoyl phosphate|Carbamoylphosphate|carbamoyl-phosphate|carbamoyl phosphate, extracellular" compartment="C\_e">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: CH<sub>3</sub>NO<sub>5</sub>P, extracellular</p></html>

</notes>

</species>

<species id="M\_C00170\_c" name="5'-Methylthioadenosine|Methylthioadenosine|S-Methyl-5'-thioadenosine|5-Methylthioadenosine|5'-Deoxy-5'-(methylthio)adenosine|Thiomethyladenosine|MTA|methylthioadenosine" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>11</sub>H<sub>15</sub>N<sub>5</sub>O<sub>3</sub>S</p></html>

</notes>

</species>

<species id="M\_C00175\_c" name="Cobalt|Co<sup>2+</sup>" compartment="C\_c">



```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Co</p></html>
    </notes>
  </species>
  <species id="M_C00175_e" name="Cobalt|Co2+, extracellular" compartment="C_e">
    <notes>
      <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          Co,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00178_c" name="Thymine|5-Methyluracil|thymine" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H6N2O2</p></html>
    </notes>
  </species>
  <species id="M_C00179_c" name="Agmatine|(4-Aminobutyl) guanidine|agmatine"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H16N4</p></html>
    </notes>
  </species>
  <species id="M_C00180_c" name="Benzoate|Benzoic acid|Benzenecarboxylic
acid|Phenylformic acid|Dracylic acid|benzoate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H5O2</p></html>
    </notes>
  </species>
  <species id="M_C00181_c" name="D-Xylose|Wood sugar|D-xylose|Xylose|xylose"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O5</p></html>
    </notes>
  </species>
  <species id="M_C00181_e" name="D-Xylose|Wood sugar|D-xylose|Xylose|xylose,
extracellular" compartment="C_e">
    <notes>
      <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          C5H10O5,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00182_c" name="Glycogen|glycogen" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C30H52O26</p></html>
    </notes>
  </species>

```

```

</species>
  <species id="M_C00182_e" name="Glycogen|glycogen, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C30H52O26,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00183_c" name="L-Valine|2-Amino-3-methylbutyric acid|L-valine|l-valine"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H11NO2</p></html>
    </notes>
  </species>
  <species id="M_C00183_e" name="L-Valine|2-Amino-3-methylbutyric acid|L-valine|l-valine,
extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C5H11NO2,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00184_c"
name="Glycerone|Dihydroxyacetone|1,3-Dihydroxyacetone|1,3-Dihydroxy-2-propanone|1,3-Dihy
droxypropan-2-one" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H6O3</p></html>
    </notes>
  </species>
  <species id="M_C00184_e"
name="Glycerone|Dihydroxyacetone|1,3-Dihydroxyacetone|1,3-Dihydroxy-2-propanone|1,3-Dihy
droxypropan-2-one, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C3H6O3,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00185_c"
name="Cellobiose|1-beta-D-Glucopyranosyl-4-D-glucopyranose|cellobiose|CELB"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C12H22O11</p></html>
    </notes>
  </species>
  <species id="M_C00185_e"
name="Cellobiose|1-beta-D-Glucopyranosyl-4-D-glucopyranose|cellobiose|CELB, extracellular"

```

```

compartment="C_e">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C12H22O11,
extracellular</p></html>
  </notes>
</species>
  <species id="M_C00186_c" name="(S)-Lactate|L-Lactate|L-Lactic acid|(S)-lactate|LCTT"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H5O3</p></html>
  </notes>
</species>
  <species id="M_C00186_e" name="(S)-Lactate|L-Lactate|L-Lactic acid|(S)-lactate|LCTT,
extracellular" compartment="C_e">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C3H5O3,
extracellular</p></html>
  </notes>
</species>
  <species      id="M_C00188_c"      name="L-Threonine|2-Amino-3-hydroxybutyric
acid|L-threonine|threonine|l-threonine" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H9NO3</p></html>
  </notes>
</species>
  <species      id="M_C00188_e"      name="L-Threonine|2-Amino-3-hydroxybutyric
acid|L-threonine|threonine|l-threonine, extracellular" compartment="C_e">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C4H9NO3,
extracellular</p></html>
  </notes>
</species>
  <species      id="M_C00189_c"
name="Ethanolamine|Aminoethanol|2-Hydroxyethylamine|ethanol-amine" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H8NO</p></html>
  </notes>
</species>
  <species      id="M_C00189_e"
name="Ethanolamine|Aminoethanol|2-Hydroxyethylamine|ethanol-amine,      extracellular"
compartment="C_e">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C2H8NO,
extracellular</p></html>

```

```

    </notes>
</species>
  <species          id="M_C00191_c"          name="D-Glucuronate|Glucuronic
acid|Glucuronate|D-Glucuronic acid|D-glucuronate|glucuronate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9O7</p></html>
    </notes>
  </species>
  <species          id="M_C00191_e"          name="D-Glucuronate|Glucuronic
acid|Glucuronate|D-Glucuronic          acid|D-glucuronate|glucuronate,          extracellular"
compartment="C_e">
    <notes>
      <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          C6H9O7,
extracellular</p></html>
    </notes>
  </species>
  <species          id="M_C00196_c"          name="2,3-Dihydroxybenzoate|2,3-Dihydroxybenzoic
acid|2,3-dihydroxybenzoate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H5O4</p></html>
    </notes>
  </species>
  <species          id="M_C00197_c"          name="3-Phospho-D-glycerate|D-Glycerate
3-phosphate|3-Phospho-(R)-glycerate|3-phospho-D-glycerate|Glycerate
3-phosphate|3-Phosphoglycerate|3-Phospho-DL-glycerate|DL-Glycerate
3-phosphate|3-phosphoglycerate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H5O7P</p></html>
    </notes>
  </species>
  <species          id="M_C00197_e"          name="3-Phospho-D-glycerate|D-Glycerate
3-phosphate|3-Phospho-(R)-glycerate|3-phospho-D-glycerate|Glycerate
3-phosphate|3-Phosphoglycerate|3-Phospho-DL-glycerate|DL-Glycerate
3-phosphate|3-phosphoglycerate, extracellular" compartment="C_e">
    <notes>
      <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          C3H5O7P,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00198_c" name="D-Glucono-1,5-lactone|Gluconic lactone|Gluconic acid
lactone|1,5-Gluconolactone|delta-Gluconolactone|D-Gluconolactone|Gluconolactone|D-Aldonolac
tone|D-threo-Aldono-1,5-lactone|D-glucono-1,5-lactone" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H10O6</p></html>

```

```

    </notes>
</species>
    <species id="M_C00199_c" name="D-Ribulose
5-phosphate|D-Ribulose5-phosphate|D-ribulose 5-phosphate" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O8P</p></html>
    </notes>
</species>
    <species id="M_C00203_c" name="UDP-N-acetyl-D-galactosamine" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C17H25N3O17P2</p></html>
    </notes>
</species>
    <species id="M_C00204_c"
name="2-Dehydro-3-deoxy-D-gluconate|2-dehydro-3-deoxy-D-gluconate|2-keto-3-deoxygluconat
e" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9O6</p></html>
    </notes>
</species>
    <species id="M_C00204_e"
name="2-Dehydro-3-deoxy-D-gluconate|2-dehydro-3-deoxy-D-gluconate|2-keto-3-deoxygluconat
e, extracellular" compartment="C_e">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9O6,
extracellular</p></html>
    </notes>
</species>
    <species id="M_C00206_c" name="dADP|2'-Deoxyadenosine 5'-diphosphate|dadp"
compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H13N5O9P2</p></html>
    </notes>
</species>
    <species id="M_C00208_c" name="Maltose|Malt
sugar|1-alpha-D-Glucopyranosyl-4-alpha-D-glucopyranose|maltose" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C12H22O11</p></html>
    </notes>
</species>
    <species id="M_C00208_e" name="Maltose|Malt
sugar|1-alpha-D-Glucopyranosyl-4-alpha-D-glucopyranose|maltose,
extracellular"

```

```

compartment="C_e">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C12H22O11,
extracellular</p></html>
  </notes>
</species>
  <species id="M_C00209_c" name="Oxalate|Oxalic acid|Ethanedioic acid|oxalate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2O4</p></html>
  </notes>
</species>
  <species id="M_C00212_c" name="Adenosine|adenosine" compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H13N5O4</p></html>
  </notes>
</species>
  <species id="M_C00212_e" name="Adenosine|adenosine, extracellular"
compartment="C_e">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C10H13N5O4,
extracellular</p></html>
  </notes>
</species>
  <species id="M_C00214_c" name="Thymidine|Deoxythymidine|thymidine"
compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H14N2O5</p></html>
  </notes>
</species>
  <species id="M_C00214_e" name="Thymidine|Deoxythymidine|thymidine, extracellular"
compartment="C_e">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C10H14N2O5,
extracellular</p></html>
  </notes>
</species>
  <species id="M_C00216_c" name="D-Arabinose" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O5</p></html>
  </notes>
</species>

```

```

<species id="M_C00216_e" name="D-Arabinose, extracellular" compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O5,
extracellular</p></html>
  </notes>
</species>
<species id="M_C00217_c" name="D-Glutamate|D-Glutamic acid|D-Glutaminic
acid|D-2-Aminoglutaric acid|D-glutamate|d-glutamate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H8NO4</p></html>
  </notes>
</species>
<species id="M_C00217_e" name="D-Glutamate|D-Glutamic acid|D-Glutaminic
acid|D-2-Aminoglutaric acid|D-glutamate|d-glutamate, extracellular" compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H8NO4,
extracellular</p></html>
  </notes>
</species>
<species id="M_C00221_c" name="beta-D-Glucose|beta-D-glucose|beta-d-glucose"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O6</p></html>
  </notes>
</species>
<species id="M_C00222_c" name="3-Oxopropanoate|Malonate
semialdehyde|3-oxopropanoate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H3O3</p></html>
  </notes>
</species>
<species id="M_C00224_c" name="Adenylyl sulfate|Adenosine
5'-phosphosulfate|APS|5'-Adenylyl sulfate|adenylylsulfate|adenylyl
sulfate|Adenosine5-phosphosulfate|aps" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H12N5O10PS</p></html>
  </notes>
</species>
<species id="M_C00227_c" name="Acetyl
phosphate|Acetylphosphate|acetyl-phosphate|acetyl
phosphate|acetylphosphate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H4O5P</p></html>

```

```

    </notes>
</species>
  <species      id="M_C00229_c"      name="Acyl-carrier      protein|ACP|[Acyl-carrier
protein]|Holo-[acyl-carrie-protein]|acyl carrier protein|acylcarrierprotein" compartment="C_c">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C11H21N2O7PRS</p></html>
    </notes>
</species>
  <species      id="M_C00231_c"      name="D-Xylulose
5-phosphate|D-Xylulose5-phosphate|D-xylulose      5-phosphate|D-xylulose-5-phosphate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O8P</p></html>
    </notes>
</species>
  <species      id="M_C00232_c"      name="Succinate      semialdehyde|Succinic
semialdehyde|4-Oxobutanoate|succinate semialdehyde" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H5O3</p></html>
    </notes>
</species>
  <species      id="M_C00233_c"
name="4-Methyl-2-oxopentanoate|2-Oxoisocaproate|4-methyl-2-oxopentanoate|4MOP|2-ketoisoc
aproate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9O3</p></html>
    </notes>
</species>
  <species      id="M_C00234_c"
name="10-Formyltetrahydrofolate|10-Formyl-THF|10-formyltetrahydrofolate|10-formyl-thf"
compartment="C_c">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H21N7O7</p></html>
    </notes>
</species>
  <species      id="M_C00235_c"      name="Dimethylallyl      diphosphate|Prenyl
diphosphate|2-Isopentenyl      diphosphate|delta2-Isopentenyl      diphosphate|delta-Prenyl
diphosphate|DMAPP|Dimethylallyldiphosphate|dimethylallyl diphosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O7P2</p></html>
    </notes>
</species>

```



```

    <species id="M_C00236_c" name="3-Phospho-D-glyceroyl
phosphate|1,3-Bisphospho-D-glycerate|(R)-2-Hydroxy-3-(phosphonoxy)-1-monoanhydride with
phosphoric propanoic acid|3-Phospho-D-glyceroylphosphate|3-phospho-D-glyceroyl
phosphate|3-phospho-d-glyceroyl-phosphate" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H6O10P2</p></html>
    </notes>
</species>
    <species id="M_C00237_c" name="CO|Carbon monoxide" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: CO</p></html>
    </notes>
</species>
    <species id="M_C00238_c" name="Potassium|K+|potassium" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: K</p></html>
    </notes>
</species>
    <species id="M_C00238_e" name="Potassium|K+|potassium, extracellular"
compartment="C_e">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: K,
extracellular</p></html>
    </notes>
</species>
    <species id="M_C00239_c" name="dCMP|Deoxycytidylic acid|Deoxycytidine
monophosphate|Deoxycytidylate|2'-Deoxycytidine 5'-monophosphate|dcmp"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H13N3O7P</p></html>
    </notes>
</species>
    <species id="M_C00242_c" name="Guanine|2-Amino-6-hydroxypurine|guanine|GNN"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H5N5O</p></html>
    </notes>
</species>
    <species id="M_C00242_e" name="Guanine|2-Amino-6-hydroxypurine|guanine|GNN,
extracellular" compartment="C_e">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H5N5O,
extracellular</p></html>

```

```

    </notes>
</species>
    <species id="M_C00243_c"
name="Lactose|1-beta-D-Galactopyranosyl-4-alpha-D-glucopyranose|Milk
sugar|alpha-Lactose|Anhydrous lactose|lactose|LACT" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C12H22O11</p></html>
    </notes>
</species>
    <species id="M_C00243_e"
name="Lactose|1-beta-D-Galactopyranosyl-4-alpha-D-glucopyranose|Milk
sugar|alpha-Lactose|Anhydrous lactose|lactose|LACT, extracellular" compartment="C_e">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C12H22O11,
extracellular</p></html>
    </notes>
</species>
    <species id="M_C00244_c" name="Nitrate|Nitric acid|nitrate" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: NO3</p></html>
    </notes>
</species>
    <species id="M_C00244_e" name="Nitrate|Nitric acid|nitrate, extracellular"
compartment="C_e">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: NO3,
extracellular</p></html>
    </notes>
</species>
    <species id="M_C00245_c" name="Taurine|2-Aminoethanesulfonic acid|Aminoethylsulfonic
acid|taurine" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H7NO3S</p></html>
    </notes>
</species>
    <species id="M_C00245_e" name="Taurine|2-Aminoethanesulfonic acid|Aminoethylsulfonic
acid|taurine, extracellular" compartment="C_e">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H7NO3S,
extracellular</p></html>
    </notes>
</species>
    <species id="M_C00246_c" name="Butanoic acid|Butanoate|Butyrate|Butyric
acid|M_Butyrate|butanoate" compartment="C_c">

```

```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H7O2</p></html>
    </notes>
  </species>
  <species id="M_C00246_e" name="Butanoic acid|Butanoate|Butyrate|Butyric
acid|M_Butyrate|butanoate, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H7O2,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00247_c" name="L-Sorbose|L-xylo-Hexulose" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O6</p></html>
    </notes>
  </species>
  <species id="M_C00247_e" name="L-Sorbose|L-xylo-Hexulose, extracellular"
compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O6,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00249_c" name="Hexadecanoic acid|Hexadecanoate|Hexadecylic
acid|Palmitic acid|Palmitate|Cetylic acid|hexadecanoate|palmitate|Hexadecanoate (n-C16:0)"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C16H31O2</p></html>
    </notes>
  </species>
  <species id="M_C00251_c" name="Chorismate|Chorismic acid|chorismate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H8O6</p></html>
    </notes>
  </species>
  <species id="M_C00251_e" name="Chorismate|Chorismic acid|chorismate, extracellular"
compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H8O6,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00252_c" name="Isomaltose|Brachiose|isomaltose" compartment="C_c">

```

```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C12H22O11</p></html>
    </notes>
  </species>
  <species id="M_C00253_c" name="Nicotinate|Nicotinic acid|Niacin|3-Pyridinecarboxylic
acid|nicotinate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H4NO2</p></html>
    </notes>
  </species>
  <species id="M_C00253_e" name="Nicotinate|Nicotinic acid|Niacin|3-Pyridinecarboxylic
acid|nicotinate, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H4NO2,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00254_c" name="Prephenate|Prephenic
acid|prephenate|prephenate-phe|prephenate-tyr" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H8O6</p></html>
    </notes>
  </species>
  <species id="M_C00255_c"
name="Riboflavin|Lactoflavin|7,8-Dimethyl-10-ribitylisoalloxazine|Vitamin B2|riboflavin|RIBF"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C17H20N4O6</p></html>
    </notes>
  </species>
  <species id="M_C00255_e"
name="Riboflavin|Lactoflavin|7,8-Dimethyl-10-ribitylisoalloxazine|Vitamin B2|riboflavin|RIBF,
extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C17H20N4O6,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00256_c" name="(R)-Lactate|D-Lactate|D-Lactic
acid|D-2-Hydroxypropanoic acid|D-2-Hydroxypropionic acid|d-lactate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H5O3</p></html>
    </notes>

```

```

</species>
  <species id="M_C00257_c" name="D-Gluconic acid|D-Gluconate|D-gluco-Hexonic
acid|D-gluconate|GLCN" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H11O7</p></html>
    </notes>
  </species>
  <species id="M_C00257_e" name="D-Gluconic acid|D-Gluconate|D-gluco-Hexonic
acid|D-gluconate|GLCN, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H11O7,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00258_c" name="D-Glycerate|Glycerate|(R)-Glycerate|Glyceric
acid|glycerate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H5O4</p></html>
    </notes>
  </species>
  <species id="M_C00259_c" name="L-Arabinose|L-Arabinopyranose|L-arabinose"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O5</p></html>
    </notes>
  </species>
  <species id="M_C00259_e" name="L-Arabinose|L-Arabinopyranose|L-arabinose,
extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O5,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00262_c" name="Hypoxanthine|Purine-6-ol|hypoxanthine|HYXN"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H4N4O</p></html>
    </notes>
  </species>
  <species id="M_C00262_e" name="Hypoxanthine|Purine-6-ol|hypoxanthine|HYXN,
extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H4N4O,
extracellular</p></html>

```

```

    </notes>
</species>
    <species          id="M_C00263_c"          name="L-Homoserine|2-Amino-4-hydroxybutyric
acid|L-homoserine" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H9NO3</p></html>
    </notes>
</species>
    <species id="M_C00266_c" name="Glycolaldehyde|Hydroxyacetaldehyde|glycolaldehyde"
compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H4O2</p></html>
    </notes>
</species>
    <species          id="M_C00267_c"          name="D-Glucose|Grape
sugar|alpha-D-Glucose|Dextrose|alpha-D-glucose|D-glucose|Glucose|glucose"
compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O6</p></html>
    </notes>
</species>
    <species          id="M_C00267_e"          name="D-Glucose|Grape
sugar|alpha-D-Glucose|Dextrose|alpha-D-glucose|D-glucose|Glucose|glucose,
extracellular"
compartment="C_e">
    <notes>
        <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          C6H12O6,
extracellular</p></html>
    </notes>
</species>
    <species          id="M_C00268_c"
name="Dihydrobiopterin|6,7-Dihydrobiopterin|Quinoid-dihydrobiopterin|(6R)-6-(L-erythro-1,2-D
ihydroxypropyl)-7,8-dihydro-6H-pterin" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H13N5O3</p></html>
    </notes>
</species>
    <species          id="M_C00270_c"          name="N-Acetylneuraminate|N-Acetylneuraminic
acid|5-Acetamido-3,5-dideoxy-D-glycero-D-galacto-2-nonulosonic          acid|Neu5Ac"
compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C11H18NO9</p></html>
    </notes>
</species>
    <species          id="M_C00270_e"          name="N-Acetylneuraminate|N-Acetylneuraminic

```

acid|5-Acetamido-3,5-dideoxy-D-glycero-D-galacto-2-nonulosonic acid|Neu5Ac, extracellular"  
 compartment="C\_e">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C11H18NO9,  
 extracellular</p></html>  
 </notes>  
</species>  
 <species id="M\_C00272\_c"  
 name="Tetrahydrobiopterin|5,6,7,8-Tetrahydrobiopterin|2-Amino-6-(1,2-dihydroxypropyl)-5,6,7,8  
 -tetrahydro-4(1H)-pteridinone" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H15N5O3</p></html>  
 </notes>  
</species>  
 <species id="M\_C00275\_c" name="D-Mannose  
 6-phosphate|D-Mannose6-phosphate|D-mannose-6-phosphate|D-mannose 6-phosphate"  
 compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O9P</p></html>  
 </notes>  
</species>  
 <species id="M\_C00275\_e" name="D-Mannose  
 6-phosphate|D-Mannose6-phosphate|D-mannose-6-phosphate|D-mannose 6-phosphate,  
 extracellular" compartment="C\_e">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O9P,  
 extracellular</p></html>  
 </notes>  
</species>  
 <species id="M\_C00279\_c" name="D-Erythrose  
 4-phosphate|D-Erythrose4-phosphate|D-erythrose 4-phosphate" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H8O7P</p></html>  
 </notes>  
</species>  
 <species id="M\_C00283\_c" name="Hydrogen  
 sulfide|Hydrogen-sulfide|H2S|Hydrogensulfide|Sulfide|h2s|Thioether" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: H2S</p></html>  
 </notes>  
</species>  
 <species id="M\_C00283\_e" name="Hydrogen  
 sulfide|Hydrogen-sulfide|H2S|Hydrogensulfide|Sulfide|h2s|Thioether,  
 extracellular"  
 compartment="C\_e">

```

    <notes>
      <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          H2S,
extracellular</p></html>
    </notes>
  </species>
  <species          id="M_C00286_c"          name="dGTP|2'-Deoxyguanosine
5'-triphosphate|Deoxyguanosine          5'-triphosphate|Deoxyguanosine          triphosphate|dgtp"
compartment="C_c">
    <notes>
      <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H13N5O13P3</p></html>
    </notes>
  </species>
  <species          id="M_C00288_c"          name="HCO3-|Bicarbonate|Hydrogencarbonate|Acid
carbonate|Carbonic          acid|Dihydrogen          carbonate|H2CO3|carbonic
acid|carbonicacid|HCO(3-)|HCO3(-)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: CHO3</p></html>
    </notes>
  </species>
  <species id="M_C00291_c" name="Nickel|Ni2+|nickel" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Ni</p></html>
    </notes>
  </species>
  <species id="M_C00291_e" name="Nickel|Ni2+|nickel, extracellular" compartment="C_e">
    <notes>
      <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          Ni,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00294_c" name="Inosine|inosine" compartment="C_c">
    <notes>
      <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H12N4O5</p></html>
    </notes>
  </species>
  <species id="M_C00294_e" name="Inosine|inosine, extracellular" compartment="C_e">
    <notes>
      <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          C10H12N4O5,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00295_c" name="Orotate|Orotic acid|Uracil-6-carboxylic acid|orotate"

```



```

compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H3N2O4</p></html>
  </notes>
</species>
<species id="M_C00299_c" name="Uridine|uridine" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H12N2O6</p></html>
  </notes>
</species>
<species id="M_C00299_e" name="Uridine|uridine, extracellular" compartment="C_e">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C9H12N2O6,
extracellular</p></html>
  </notes>
</species>
<species id="M_C00301_c" name="ADP-ribose|ADPribose" compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C15H21N5O14P2</p></html>
  </notes>
</species>
<species      id="M_C00305_c"      name="Magnesium|Mg2+|magnesium|Mg|Mg(2+)"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Mg</p></html>
  </notes>
</species>
<species id="M_C00305_e" name="Magnesium|Mg2+|magnesium|Mg|Mg(2+), extracellular"
compartment="C_e">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      Mg,
extracellular</p></html>
  </notes>
</species>
<species      id="M_C00309_c"
name="D-Ribulose|D-erythro-2-Pentulose|D-Arabinoketose|D-Arabinulose|D-Riboketose"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O5</p></html>
  </notes>
</species>
<species id="M_C00310_c" name="D-Xylulose|D-threo-Pentulose|D-Lyxulose|D-xylulose"
compartment="C_c">

```

```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O5</p></html>
    </notes>
  </species>
  <species id="M_C00311_c" name="Isocitrate|Isocitric acid|1-Hydroxytricarballic
acid|1-Hydroxypropane-1,2,3-tricarboxylic acid|isocitrate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H5O7</p></html>
    </notes>
  </species>
  <species id="M_C00312_c" name="L-Xylulose|L-threo-Pentulose|L-Lyxulose"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O5</p></html>
    </notes>
  </species>
  <species id="M_C00315_c"
name="Spermidine|N-(3-Aminopropyl)-1,4-butane-diamine|spermidine" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H22N3</p></html>
    </notes>
  </species>
  <species id="M_C00320_c" name="Thiosulfate|Hyposulfite|H2S2O3|thiosulfate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: O3S2</p></html>
    </notes>
  </species>
  <species id="M_C00327_c" name="L-Citrulline|2-Amino-5-ureidovaleric
acid|Citrulline|L-citrulline|citrulline" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H13N3O3</p></html>
    </notes>
  </species>
  <species id="M_C00327_e" name="L-Citrulline|2-Amino-5-ureidovaleric
acid|Citrulline|L-citrulline|citrulline, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H13N3O3,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00329_c"
name="D-Glucosamine|Chitosamine|2-Amino-2-deoxy-D-glucose|GLUM" compartment="C_c">
    <notes>

```

```

        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H14NO5</p></html>
    </notes>
</species>
    <species id="M_C00329_e"
name="D-Glucosamine|Chitosamine|2-Amino-2-deoxy-D-glucose|GLUM, extracellular"
compartment="C_e">
        <notes>
            <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H14NO5,
extracellular</p></html>
        </notes>
    </species>
    <species id="M_C00330_c" name="Deoxyguanosine|2'-Deoxyguanosine|deoxyguanosine"
compartment="C_c">
        <notes>
            <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H13N5O4</p></html>
        </notes>
    </species>
    <species id="M_C00332_c" name="Acetoacetyl-CoA|Acetoacetyl coenzyme
A|3-Acetoacetyl-CoA|acetoacetyl-CoA|acetoacetyl-coa" compartment="C_c">
        <notes>
            <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C25H37N7O18P3S</p></html>
        </notes>
    </species>
    <species id="M_C00333_c" name="D-Galacturonate|D-Galacturonic acid|D-galacturonate"
compartment="C_c">
        <notes>
            <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9O7</p></html>
        </notes>
    </species>
    <species id="M_C00333_e" name="D-Galacturonate|D-Galacturonic acid|D-galacturonate,
extracellular" compartment="C_e">
        <notes>
            <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9O7,
extracellular</p></html>
        </notes>
    </species>
    <species id="M_C00334_c" name="4-Aminobutanoate|4-Aminobutanoic
acid|4-Aminobutyrate|4-Aminobutyric acid|gamma-Aminobutyric
acid|4-Aminobutylate|4-aminobutanoate|GABA|4-aminobutyrate" compartment="C_c">
        <notes>
            <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H9NO2</p></html>
        </notes>
    </species>

```

```

</species>
  <species          id="M_C00334_e"          name="4-Aminobutanoate|4-Aminobutanoic
acid|4-Aminobutyrate|4-Aminobutyric          acid|gamma-Aminobutyric
acid|4-Aminobutylate|4-aminobutanoate|GABA|4-aminobutyrate,          extracellular"
compartment="C_e">
  <notes>
    <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          C4H9NO2,
extracellular</p></html>
  </notes>
</species>
  <species          id="M_C00337_c"
name="(S)-Dihydroorotate|(S)-4,5-Dihydroorotate|L-Dihydroorotate|L-Dihydroorotic
acid|Dihydro-L-orotic acid|S-Dihydroorotate|(S)-dihydroorotate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H5N2O4</p></html>
  </notes>
</species>
  <species id="M_C00341_c" name="Geranyl diphosphate|Geranyldiphosphate|geranyl
diphosphate" compartment="C_c">
  <notes>
    <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H18O7P2</p></html>
  </notes>
</species>
  <species          id="M_C00342_c"          name="trdrd|Reduced
thioredoxin|Thioredoxin|Reducedthioredoxin|reduced thioredoxin" compartment="C_c">
  <notes>
    <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C6H9NO2R2S2</p></html>
  </notes>
</species>
  <species          id="M_C00343_c"          name="trdox|Oxidized          thioredoxin|Thioredoxin
disulfide|Thioredoxin sulfide|Oxidizedthioredoxin|oxidized thioredoxin" compartment="C_c">
  <notes>
    <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C6H7NO2R2S2</p></html>
  </notes>
</species>
  <species          id="M_C00345_c"          name="6-Phospho-D-gluconate|6-phospho-D-gluconate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H11O10P</p></html>
  </notes>
</species>

```

```

    <species      id="M_C00345_e"      name="6-Phospho-D-gluconate|6-phospho-D-gluconate,
extracellular" compartment="C_e">
    <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C6H11O10P,
extracellular</p></html>
    </notes>
</species>
    <species      id="M_C00346_c"      name="Ethanolamine
phosphate|O-Phosphorylethanolamine|Phosphoethanolamine|O-Phosphoethanolamine"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H8NO4P</p></html>
    </notes>
</species>
    <species      id="M_C00346_e"      name="Ethanolamine
phosphate|O-Phosphorylethanolamine|Phosphoethanolamine|O-Phosphoethanolamine,
extracellular" compartment="C_e">
    <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C2H8NO4P,
extracellular</p></html>
    </notes>
</species>
    <species      id="M_C00348_c"      name="Undecaprenyl
phosphate|Undecaprenylphosphate|undecaprenyl phosphate" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C55H90O4P</p></html>
    </notes>
</species>
    <species      id="M_C00352_c"      name="D-Glucosamine      6-phosphate|D-Glucosamine
phosphate|D-Glucosamine6-phosphate|D-glucosamine      6-phosphate|d-glucosamine-6-phosphate"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H14NO8P</p></html>
    </notes>
</species>
    <species      id="M_C00352_e"      name="D-Glucosamine      6-phosphate|D-Glucosamine
phosphate|D-Glucosamine6-phosphate|D-glucosamine      6-phosphate|d-glucosamine-6-phosphate,
extracellular" compartment="C_e">
    <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C6H14NO8P,
extracellular</p></html>
    </notes>
</species>
    <species      id="M_C00353_c"      name="Geranylgeranyl      diphosphate|Geranylgeranyl

```

pyrophosphate|all-trans-Geranylgeranyl diphosphate|all-trans-Geranylgeranyl pyrophosphate"  
compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C20H34O7P2</p></html>

</notes>

</species>

<species id="M\_C00356\_c"  
name="(S)-3-Hydroxy-3-methylglutaryl-CoA|Hydroxymethylglutaryl-CoA|Hydroxymethylglutar  
oyl coenzyme  
A|HMG-CoA|3-Hydroxy-3-methylglutaryl-CoA|3-hydroxy-3-methylglutaryl-CoA|(S)-3-hydroxy-  
3-methylglutaryl-CoA" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C27H40N7O20P3S</p></html>

</notes>

</species>

<species id="M\_C00357\_c" name="N-Acetyl-D-glucosamine  
6-phosphate|N-acetyl-D-glucosamine 6-phosphate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H15NO9P</p></html>

</notes>

</species>

<species id="M\_C00360\_c" name="dAMP|2'-Deoxyadenosine  
5'-phosphate|2'-Deoxyadenosine 5'-monophosphate|Deoxyadenylic acid|Deoxyadenosine  
monophosphate|damp" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C10H13N5O6P</p></html>

</notes>

</species>

<species id="M\_C00361\_c" name="dGDP|2'-Deoxyguanosine 5'-diphosphate|dgdp"  
compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C10H13N5O10P2</p></html>

</notes>

</species>

<species id="M\_C00362\_c" name="dGMP|2'-Deoxyguanosine  
5'-monophosphate|2'-Deoxyguanosine 5'-phosphate|Deoxyguanylic acid|Deoxyguanosine  
monophosphate|dgmp" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C10H13N5O7P</p></html>

```

    </notes>
</species>
  <species id="M_C00363_c" name="dTDP|Deoxythymidine 5'-diphosphate|dtdp"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H14N2O11P2</p></html>
    </notes>
</species>
  <species id="M_C00364_c" name="dTMP|Thymidine 5'-phosphate|Deoxythymidine
5'-phosphate|Thymidylic acid|5'-Thymidylic acid|Thymidine monophosphate|Deoxythymidylic
acid|Thymidylate|dtmp" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H14N2O8P</p></html>
    </notes>
</species>
  <species id="M_C00364_e" name="dTMP|Thymidine 5'-phosphate|Deoxythymidine
5'-phosphate|Thymidylic acid|5'-Thymidylic acid|Thymidine monophosphate|Deoxythymidylic
acid|Thymidylate|dtmp, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H14N2O8P,
extracellular</p></html>
    </notes>
</species>
  <species id="M_C00365_c" name="dUMP|Deoxyuridylic acid|Deoxyuridine
monophosphate|Deoxyuridine 5'-phosphate|2'-Deoxyuridine 5'-phosphate|dump"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H12N2O8P</p></html>
    </notes>
</species>
  <species id="M_C00366_c" name="Urate|Uric acid|urate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H4N4O3</p></html>
    </notes>
</species>
  <species id="M_C00366_e" name="Urate|Uric acid|urate, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H4N4O3,
extracellular</p></html>
    </notes>
</species>

```

<species id="M\_C00378\_c" name="Thiamin|Thiamine|Vitamin B1|Aneurin|Antiberiberi factor|thiamine|THI" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C12H17N4OS</p></html>

</notes>

</species>

<species id="M\_C00378\_e" name="Thiamin|Thiamine|Vitamin B1|Aneurin|Antiberiberi factor|thiamine|THI, extracellular" compartment="C\_e">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C12H17N4OS, extracellular</p></html>

</notes>

</species>

<species id="M\_C00380\_c" name="Cytosine|cytosine" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H5N3O</p></html>

</notes>

</species>

<species id="M\_C00380\_e" name="Cytosine|cytosine, extracellular" compartment="C\_e">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H5N3O, extracellular</p></html>

</notes>

</species>

<species id="M\_C00385\_c" name="Xanthine|xanthine|XAN" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H4N4O2</p></html>

</notes>

</species>

<species id="M\_C00385\_e" name="Xanthine|xanthine|XAN, extracellular" compartment="C\_e">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H4N4O2, extracellular</p></html>

</notes>

</species>

<species id="M\_C00387\_c" name="Guanosine|guanosine" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H13N5O5</p></html>

</notes>

</species>

<species id="M\_C00387\_e" name="Guanosine|guanosine, extracellular"



```

compartment="C_e">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C10H13N5O5,
extracellular</p></html>
  </notes>
</species>
  <species
                                id="M_C00389_c"
name="Quercetin|3,3',4,5,7-Pentahydroxyflavone|3,5,7,3',4'-Pentahydroxyflavone"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C15H9O7</p></html>
  </notes>
</species>
  <species      id="M_C00392_c"      name="Mannitol|D-Mannitol|mannitol|MNTL"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H14O6</p></html>
  </notes>
</species>
  <species id="M_C00392_e" name="Mannitol|D-Mannitol|mannitol|MNTL, extracellular"
compartment="C_e">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C6H14O6,
extracellular</p></html>
  </notes>
</species>
  <species id="M_C00395_c" name="Penicillin|Penam" compartment="C_c">
  <notes>
    <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H10N2O4RS</p></html>
  </notes>
</species>
  <species id="M_C00402_c" name="D-Aspartate|D-Aspartic acid" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H7NO4</p></html>
  </notes>
</species>
  <species
                                id="M_C00407_c"      name="L-Isoleucine|2-Amino-3-methylvaleric
acid|L-isoleucine|l-iso-leucine" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H13NO2</p></html>
  </notes>
</species>
  <species
                                id="M_C00407_e"      name="L-Isoleucine|2-Amino-3-methylvaleric

```

acid|L-isoleucine|l-iso-leucine, extracellular" compartment="C\_e">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>6</sub>H<sub>13</sub>NO<sub>2</sub>, extracellular</p></html>

</notes>

</species>

<species id="M\_C00412\_c" name="Stearoyl-CoA|Stearyl-CoA|Stearyl coenzyme A|Stearyl-CoA (n-C18:0CoA)|strcoa|Stearoyl-CoA (n-C18:0CoA)" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>39</sub>H<sub>67</sub>N<sub>7</sub>O<sub>17</sub>P<sub>3</sub>S</p></html>

</notes>

</species>

<species id="M\_C00415\_c" name="Dihydrofolate|Dihydrofolic acid|7,8-Dihydrofolate|7,8-Dihydrofolic acid|7,8-Dihydropteroylglutamate|dihydrofolate|7-8-Dihydrofolate|7,8-dihydrofolate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>19</sub>H<sub>19</sub>N<sub>7</sub>O<sub>6</sub></p></html>

</notes>

</species>

<species id="M\_C00417\_c" name="cis-Aconitate|cis-Aconitic acid|cis-aconitate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>6</sub>H<sub>3</sub>O<sub>6</sub></p></html>

</notes>

</species>

<species id="M\_C00424\_c" name="(S)-Lactaldehyde|L-Lactaldehyde|L-2-Hydroxypropionaldehyde" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>3</sub>H<sub>6</sub>O<sub>2</sub></p></html>

</notes>

</species>

<species id="M\_C00430\_c" name="5-Aminolevulinate|5-Amino-4-oxopentanoate|5-Amino-4-oxovaleric acid|5-amino-levulinate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>5</sub>H<sub>9</sub>NO<sub>3</sub></p></html>

</notes>

</species>

<species id="M\_C00433\_c" name="2,5-Dioxopentanoate|2-Oxoglutarate semialdehyde|2,5-dioxopentanoate" compartment="C\_c">

<notes>

```

    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H5O4</p></html>
  </notes>
</species>
  <species id="M_C00437_c"
name="N-Acetylornithine|N2-Acetyl-L-ornithine|N2-acetyl-L-ornithine|N-acetyl-L-ornithine"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H14N2O3</p></html>
  </notes>
</species>
  <species id="M_C00438_c" name="N-Carbamoyl-L-aspartate|N-carbamoyl-L-aspartate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H6N2O5</p></html>
  </notes>
</species>
  <species id="M_C00439_c"
name="N-Formimino-L-glutamate|N-Formimidoyl-L-glutamate|N-formimino-L-glutamate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9N2O4</p></html>
  </notes>
</species>
  <species id="M_C00440_c" name="5-Methyltetrahydrofolate|5-methyltetrahydrofolate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H23N7O6</p></html>
  </notes>
</species>
  <species id="M_C00441_c" name="L-Aspartate 4-semialdehyde|Aspartate
beta-semialdehyde|L-Aspartic 4-semialdehyde|L-Aspartate4-semialdehyde|L-aspartate
4-semialdehyde" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H7NO3</p></html>
  </notes>
</species>
  <species id="M_C00445_c"
name="5,10-Methenyltetrahydrofolate|5,10-methenyltetrahydrofolate|5-10-Methenyltetrahydrofol
ate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H20N7O6</p></html>
  </notes>

```

```

</species>
  <species id="M_C00446_c" name="alpha-D-Galactose 1-phosphate|alpha-D-Galactopyranose
1-phosphate|alpha-D-Galactose1-phosphate|alpha-D-galactose-1-phosphate|alpha-D-galactose
1-phosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O9P</p></html>
    </notes>
  </species>
  <species id="M_C00447_c" name="D-Sedoheptulose 1,7-bisphosphate|D-altro-Heptulose
1,7-biphosphate" compartment="C_c">
    <notes>
      <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C7H14O13P2</p></html>
    </notes>
  </species>
  <species id="M_C00448_c" name="trans,trans-Farnesyl diphosphate|Farnesyl
diphosphate|Farnesyl pyrophosphate|2-trans,6-trans-Farnesyl
diphosphate|Farnesyl diphosphate|trans,trans-farnesyl diphosphate|trans,
trans-farnesyl diphosphate" compartment="C_c">
    <notes>
      <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C15H26O7P2</p></html>
    </notes>
  </species>
  <species id="M_C00450_c"
name="2,3,4,5-Tetrahydropyridine-2-carboxylate|delta 1-Piperidine-6-L-carboxylate|2,3,4,5-tetra
hydropyridine-2-carboxylate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H8NO2</p></html>
    </notes>
  </species>
  <species id="M_C00455_c" name="Nicotinamide D-ribonucleotide|NMN|Nicotinamide
mononucleotide|Nicotinamide ribonucleotide|Nicotinamide nucleotide|beta-Nicotinamide
D-ribonucleotide|beta-Nicotinamide ribonucleotide|beta-Nicotinamide
mononucleotide|nicotinamide ribonucleotide|nicotinamide nucleotide" compartment="C_c">
    <notes>
      <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C11H15N2O8P</p></html>
    </notes>
  </species>
  <species id="M_C00458_c" name="dCTP|Deoxycytidine 5'-triphosphate|Deoxycytidine
triphosphate|2'-Deoxycytidine 5'-triphosphate|dctp" compartment="C_c">
    <notes>
      <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:

```

C9H13N3O13P3</p></html>  
 </notes>  
 </species>  
 <species id="M\_C00459\_c" name="dTTP|Deoxythymidine triphosphate|Deoxythymidine 5'-triphosphate|TTP|ttp" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C10H14N2O14P3</p></html>  
 </notes>  
 </species>  
 <species id="M\_C00460\_c" name="dUTP|2'-Deoxyuridine 5'-triphosphate|dutp" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C9H12N2O14P3</p></html>  
 </notes>  
 </species>  
 <species id="M\_C00463\_c" name="Indole|2,3-Benzopyrrole|indole|indol" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H7N</p></html>  
 </notes>  
 </species>  
 <species id="M\_C00469\_c" name="Ethanol|Ethyl alcohol|Methylcarbinol|Dehydrated ethanol|ethanol|ETOH" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H6O</p></html>  
 </notes>  
 </species>  
 <species id="M\_C00469\_e" name="Ethanol|Ethyl alcohol|Methylcarbinol|Dehydrated ethanol|ethanol|ETOH, extracellular" compartment="C\_e">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H6O, extracellular</p></html>  
 </notes>  
 </species>  
 <species id="M\_C00475\_c" name="Cytidine|cytidine" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H13N3O5</p></html>  
 </notes>  
 </species>  
 <species id="M\_C00475\_e" name="Cytidine|cytidine, extracellular" compartment="C\_e">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H13N3O5,

extracellular</p></html>  
 </notes>  
</species>  
 <species id="M\_C00476\_c" name="D-Lyxose" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O5</p></html>  
 </notes>  
</species>  
 <species id="M\_C00479\_c" name="Propanal|Propionaldehyde" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H6O</p></html>  
 </notes>  
</species>  
 <species id="M\_C00487\_c"  
 name="L-Carnitine|L-gamma-Trimethyl-beta-hydroxybutyrobetaine|Vitamin  
 BT|3-Carboxy-2-hydroxy-N,N,N-trimethyl-1-propanaminium hydroxide, inner  
 salt|Levocarnitine|(R)-Carnitine|Carnitine|gamma-Trimethyl-hydroxybutyrobetaine|3-Hydroxy-4-t  
 rimethylammoniobutanoate|l-carnitine" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H15NO3</p></html>  
 </notes>  
</species>  
 <species id="M\_C00487\_e"  
 name="L-Carnitine|L-gamma-Trimethyl-beta-hydroxybutyrobetaine|Vitamin  
 BT|3-Carboxy-2-hydroxy-N,N,N-trimethyl-1-propanaminium hydroxide, inner  
 salt|Levocarnitine|(R)-Carnitine|Carnitine|gamma-Trimethyl-hydroxybutyrobetaine|3-Hydroxy-4-t  
 rimethylammoniobutanoate|l-carnitine, extracellular" compartment="C\_e">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H15NO3,  
 extracellular</p></html>  
 </notes>  
</species>  
 <species id="M\_C00488\_c" name="Formamide|Methanamide|formamide"  
 compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: CH3NO</p></html>  
 </notes>  
</species>  
 <species id="M\_C00491\_c"  
 name="L-Cystine|L-Dicysteine|L-alpha-Diamino-beta-dithiolactic acid|L-cystine"  
 compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C6H12N2O4S2</p></html>

```

    </notes>
</species>
    <species                                     id="M_C00491_e"
name="L-Cystine|L-Dicysteine|L-alpha-Diamino-beta-dithiolactic acid|L-cystine, extracellular"
compartment="C_e">
    <notes>
        <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C6H12N2O4S2,
extracellular</p></html>
    </notes>
</species>
    <species                                     id="M_C00492_c"
name="Raffinose|Melitose|Melitriose|Gossypose|6G-alpha-D-galactosylsucrose"
compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C18H32O16</p></html>
    </notes>
</species>
    <species                                     id="M_C00492_e"
name="Raffinose|Melitose|Melitriose|Gossypose|6G-alpha-D-galactosylsucrose, extracellular"
compartment="C_e">
    <notes>
        <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C18H32O16,
extracellular</p></html>
    </notes>
</species>
    <species                                     id="M_C00493_c"          name="Shikimate|Shikimic
acid|3,4,5-Trihydroxy-1-cyclohexenecarboxylic acid|shikimate" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H9O5</p></html>
    </notes>
</species>
    <species      id="M_C00497_c"          name="(R)-Malate|D-Malate|D-Malic      acid"
compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H4O5</p></html>
    </notes>
</species>
    <species      id="M_C00497_e"  name="(R)-Malate|D-Malate|D-Malic  acid, extracellular"
compartment="C_e">
    <notes>
        <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C4H4O5,
extracellular</p></html>
    </notes>
</species>

```

```

    <species id="M_C00498_c" name="ADP-glucose|Adenosine diphosphoglucose|ADPglucose"
    compartment="C_c">
      <notes>
        <html
          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
          C16H23N5O15P2</p></html>
        </notes>
      </species>
    <species
      id="M_C00499_c"
      name="Allantoate|Allantoic
      acid|allantoate"
      compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H7N4O4</p></html>
        </notes>
      </species>
    <species id="M_C00501_c" name="CDP-glucose|CDP-D-Glucose" compartment="C_c">
      <notes>
        <html
          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
          C15H23N3O16P2</p></html>
        </notes>
      </species>
    <species id="M_C00504_c" name="Folate|Pteroylglutamic
    acid|Folic
    acid|folate|FOL"
    compartment="C_c">
      <notes>
        <html
          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
          C19H17N7O6</p></html>
        </notes>
      </species>
    <species id="M_C00504_e" name="Folate|Pteroylglutamic
    acid|Folic
    acid|folate|FOL,
    extracellular" compartment="C_e">
      <notes>
        <html
          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
          C19H17N7O6,
          extracellular</p></html>
        </notes>
      </species>
    <species
      id="M_C00506_c"
      name="L-Cysteate|L-Cysteic
      acid|3-Sulfoalanine|2-Amino-3-sulfopropionic acid" compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H6NO5S</p></html>
        </notes>
      </species>
    <species
      id="M_C00506_e"
      name="L-Cysteate|L-Cysteic
      acid|3-Sulfoalanine|2-Amino-3-sulfopropionic acid, extracellular" compartment="C_e">
      <notes>
        <html
          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
          C3H6NO5S,
          extracellular</p></html>

```



```

    </notes>
</species>
  <species id="M_C00507_c" name="L-Rhamnose|6-Deoxy-L-mannose|L-Mannomethylose"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O5</p></html>
    </notes>
</species>
  <species id="M_C00507_e" name="L-Rhamnose|6-Deoxy-L-mannose|L-Mannomethylose,
extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O5,
extracellular</p></html>
    </notes>
</species>
  <species id="M_C00508_c"
name="L-Ribulose|L-erythro-Pentulose|L-Arabinoketose|L-Arabinulose|L-Riboketose|L-ribulose"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O5</p></html>
    </notes>
</species>
  <species id="M_C00511_c" name="Propenoate|Acrylic acid|Acrylate|2-Propenoic
acid|Vinylformic acid" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H3O2</p></html>
    </notes>
</species>
  <species id="M_C00513_c" name="CDP-glycerol|CDPglycerol" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C12H19N3O13P2</p></html>
    </notes>
</species>
  <species id="M_C00514_c" name="D-Mannonate|D-mannonate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H11O7</p></html>
    </notes>
</species>
  <species id="M_C00522_c" name="(R)-Pantoate|Pantoate|Pantoic
acid|R-Pantoate|(R)-pantoate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H11O4</p></html>
    </notes>

```

```

</species>
<species id="M_C00526_c"
name="Deoxyuridine|2-Deoxyuridine|2'-Deoxyuridine|deoxyuridine" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H12N2O5</p></html>
  </notes>
</species>
<species id="M_C00530_c"
name="p-Benzenediol|Hydroquinone|1,4-Benzenediol|1,4-Dihydroxybenzene|Benzene-1,4-diol|Q
uinol|4-Hydroxyphenol|Benzosemiquinone|p-Benzosemiquinone|hydroquinone"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H6O2</p></html>
  </notes>
</species>
<species id="M_C00530_e"
name="p-Benzenediol|Hydroquinone|1,4-Benzenediol|1,4-Dihydroxybenzene|Benzene-1,4-diol|Q
uinol|4-Hydroxyphenol|Benzosemiquinone|p-Benzosemiquinone|hydroquinone, extracellular"
compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H6O2,
extracellular</p></html>
  </notes>
</species>
<species id="M_C00532_c" name="L-Arabitol|L-Arabinol|L-Arabinitol|L-Lyxitol"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H12O5</p></html>
  </notes>
</species>
<species id="M_C00532_e" name="L-Arabitol|L-Arabinol|L-Arabinitol|L-Lyxitol,
extracellular" compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H12O5,
extracellular</p></html>
  </notes>
</species>
<species id="M_C00533_c" name="Nitric oxide|NO|Nitrogen monoxide|Nitricoxide"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: NO</p></html>
  </notes>
</species>
<species id="M_C00536_c" name="Triphosphate|Inorganic triphosphate|Tripolyphosphate"

```

```

compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: HO10P3</p></html>
  </notes>
</species>
  <species id="M_C00536_e" name="Triphosphate|Inorganic triphosphate|Tripolyphosphate,
extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: HO10P3,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00541_c" name="Cob(II)alamin|Vitamin B12r" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C62H89CoN13O14P</p></html>
    </notes>
  </species>
  <species id="M_C00541_e" name="Cob(II)alamin|Vitamin B12r, extracellular"
compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C62H89CoN13O14P,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00543_c" name="Dimethylamine|(CH3)2NH|dimethylamine"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H8N</p></html>
    </notes>
  </species>
  <species id="M_C00546_c" name="Methylglyoxal|Pyruvaldehyde|Pyruvic
aldehyde|2-Ketopropionaldehyde|2-Oxopropanal|methylglyoxal" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H4O2</p></html>
    </notes>
  </species>
  <species id="M_C00552_c" name="meso-Tartaric acid|meso-Tartrate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H4O6</p></html>
    </notes>
  </species>
  <species id="M_C00552_e" name="meso-Tartaric acid|meso-Tartrate, extracellular"
compartment="C_e">

```

```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H4O6,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00555_c" name="4-Aminobutanal|4-Aminobutyraldehyde|Butyraldehyde,
4-amino-" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H10NO</p></html>
    </notes>
  </species>
  <species id="M_C00558_c" name="D-Tagaturonate|D-tagaturonate|D-Tagaturonic acid"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9O7</p></html>
    </notes>
  </species>
  <species id="M_C00559_c" name="Deoxyadenosine|2'-Deoxyadenosine|deoxyadenosine"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H13N5O3</p></html>
    </notes>
  </species>
  <species id="M_C00559_e" name="Deoxyadenosine|2'-Deoxyadenosine|deoxyadenosine,
extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H13N5O3,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00568_c" name="4-Aminobenzoate|ABEE|4-Aminobenzoic
acid|p-Aminobenzoate|4-aminobenzoate|p-aminobenzoate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H6NO2</p></html>
    </notes>
  </species>
  <species id="M_C00575_c" name="3',5'-Cyclic AMP|Cyclic adenylic acid|Cyclic
AMP|Adenosine 3',5'-phosphate|cAMP" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H11N5O6P</p></html>
    </notes>
  </species>

```

```

    <species      id="M_C00576_c"      name="Betaine      aldehyde|betaine      aldehyde"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H12NO</p></html>
    </notes>
</species>
    <species id="M_C00577_c" name="D-Glyceraldehyde" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H6O3</p></html>
    </notes>
</species>
    <species
                                id="M_C00588_c"                                name="Choline
phosphate|Phosphorylcholine|Phosphocholine|O-Phosphocholine" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H14NO4P</p></html>
    </notes>
</species>
    <species
                                id="M_C00588_e"                                name="Choline
phosphate|Phosphorylcholine|Phosphocholine|O-Phosphocholine,
                                extracellular"
compartment="C_e">
    <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C5H14NO4P,
extracellular</p></html>
    </notes>
</species>
    <species
                                id="M_C00601_c"
name="Phenylacetaldehyde|alpha-Tolualdehyde|phenylacetaldehyde" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H8O</p></html>
    </notes>
</species>
    <species
                                id="M_C00601_e"
name="Phenylacetaldehyde|alpha-Tolualdehyde|phenylacetaldehyde,
                                extracellular"
compartment="C_e">
    <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C8H8O,
extracellular</p></html>
    </notes>
</species>
    <species
                                id="M_C00603_c"
name="(-)-Ureidoglycolate|(S)-Ureidoglycolate|Ureidoglycolate|ureidoglycolate|(s)-ureidoglycolat
e" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H5N2O4</p></html>

```

```

    </notes>
</species>
  <species id="M_C00612_c" name="N1-Acetylspermidine" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H23N3O</p></html>
    </notes>
  </species>
  <species id="M_C00615_c" name="Protein histidine|Protein L-histidine|[Protein]-L-histidine"
compartment="C_c">
    <notes>
      <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C7H8N4O2R2</p></html>
    </notes>
  </species>
  <species
      id="M_C00620_c"
      name="alpha-D-Ribose
1-phosphate|Ribose
1-phosphate|D-Ribose
1-phosphate|alpha-D-Ribose1-phosphate|D-ribose-1-phosphate|D-ribose
1-phosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O8P</p></html>
    </notes>
  </species>
  <species
      id="M_C00624_c"
      name="N-Acetyl-L-glutamate|N-Acetyl-L-glutamic
acid|N-acetyl-L-glutamate|n-acetyl-l-glutamate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H9NO5</p></html>
    </notes>
  </species>
  <species
                                id="M_C00630_c"
name="2-Methylpropanoyl-CoA|2-Methylpropionyl-CoA|Isobutyryl-CoA|isobutyryl-CoA"
compartment="C_c">
    <notes>
      <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C25H39N7O17P3S</p></html>
    </notes>
  </species>
  <species
      id="M_C00631_c"
      name="2-Phospho-D-glycerate|D-Glycerate
2-phosphate|D-Glycerate2-phosphate|2-phospho-D-glycerate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H5O7P</p></html>
    </notes>
  </species>
  <species
      id="M_C00631_e"
      name="2-Phospho-D-glycerate|D-Glycerate
2-phosphate|D-Glycerate2-phosphate|2-phospho-D-glycerate, extracellular" compartment="C_e">
    <notes>

```

```

        <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          C3H5O7P,
extracellular</p></html>
    </notes>
</species>
    <species      id="M_C00636_c"      name="D-Mannose      1-phosphate|alpha-D-Mannose
1-phosphate|D-Mannose1-phosphate" compartment="C_c">
        <notes>
            <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O9P</p></html>
        </notes>
    </species>
    <species      id="M_C00636_e"      name="D-Mannose      1-phosphate|alpha-D-Mannose
1-phosphate|D-Mannose1-phosphate, extracellular" compartment="C_e">
        <notes>
            <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          C6H12O9P,
extracellular</p></html>
        </notes>
    </species>
    <species      id="M_C00642_c"      name="4-Hydroxyphenylacetate|4-Hydroxyphenylacetic
acid|4-Hydroxyphenyl acetate|4-hydroxyphenylacetate" compartment="C_c">
        <notes>
            <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H7O3</p></html>
        </notes>
    </species>
    <species      id="M_C00644_c"      name="D-Mannitol
1-phosphate|D-mannitol-1-phosphate|D-mannitol 1-phosphate" compartment="C_c">
        <notes>
            <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H14O9P</p></html>
        </notes>
    </species>
    <species      id="M_C00645_c"      name="N-Acetyl-D-mannosamine|2-Acetamido-2-deoxy-D-mannose" compartment="C_c">
        <notes>
            <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H15NO6</p></html>
        </notes>
    </species>
    <species      id="M_C00645_e"      name="N-Acetyl-D-mannosamine|2-Acetamido-2-deoxy-D-mannose,
extracellular" compartment="C_e">
        <notes>
            <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          C8H15NO6,
extracellular</p></html>
        </notes>
    </species>
    <species      id="M_C00655_c"      name="Xanthosine      5'-phosphate|Xanthylic

```

acid|XMP|(9-D-Ribosylxanthine)-5'-phosphate|Xanthosine5-phosphate|xanthosine-5-phosphate"

compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H12N4O9P</p></html>

</notes>

</species>

<species id="M\_C00663\_c" name="beta-D-Glucose 1-phosphate|beta-D-glucose 1-phosphate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O9P</p></html>

</notes>

</species>

<species id="M\_C00666\_c" name="LL-2,6-Diaminoheptanedioate|LL-2,6-Diaminopimelate|LL-2,6-Diaminopimelic acid|LL-2,6-diaminopimelate|LL-2,6-diaminoheptanedioate|LL-2-6-Diaminoheptanedioate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H14N2O4</p></html>

</notes>

</species>

<species id="M\_C00668\_c" name="D-Glucose 6-phosphate|Glucose 6-phosphate|Robison ester|alpha-D-Glucose 6-phosphate|D-Glucose6-phosphate|alpha-D-glucose-6-phosphate|D-glucose-6-phosphate|D-glucose 6-phosphate|glucose-6-phosphate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O9P</p></html>

</notes>

</species>

<species id="M\_C00668\_e" name="D-Glucose 6-phosphate|Glucose 6-phosphate|Robison ester|alpha-D-Glucose 6-phosphate|D-Glucose6-phosphate|alpha-D-glucose-6-phosphate|D-glucose-6-phosphate|D-glucose 6-phosphate|glucose-6-phosphate, extracellular" compartment="C\_e">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O9P, extracellular</p></html>

</notes>

</species>

<species id="M\_C00670\_c" name="sn-glycero-3-Phosphocholine|Glycerophosphocholine|sn-Glycero-3-phosphocholine" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H20NO6P</p></html>

</notes>



```

</species>
  <species id="M_C00671_c" name="(S)-3-Methyl-2-oxopentanoic
acid|3-Methyl-2-oxopentanoate|(S)-3-Methyl-2-oxopentanoate|(3S)-3-Methyl-2-oxopentanoic
acid|(3S)-3-Methyl-2-oxopentanoate|S-3-Methyl-2-oxopentanoate|3MOP|2-Oxo-3-methylvalerate|
3-methyl-2-oxopentanoate|2-keto-3-methylvalerate|2-keto-3-methyl-valerate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9O3</p></html>
  </notes>
</species>
  <species id="M_C00672_c" name="2-Deoxy-D-ribose 1-phosphate|2-Deoxy-alpha-D-ribose
1-phosphate|2-Deoxy-D-ribose1-phosphate|2-deoxy-D-ribose
1-phosphate|deoxyribose-1-phosphate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O7P</p></html>
  </notes>
</species>
  <species id="M_C00673_c" name="2-Deoxy-D-ribose
5-phosphate|2-Deoxy-D-ribose5-phosphate|2-deoxy-D-ribose
5-phosphate|deoxyribose-5-phosphate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O7P</p></html>
  </notes>
</species>
  <species id="M_C00679_c" name="5-Dehydro-4-deoxy-D-glucarate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H6O7</p></html>
  </notes>
</species>
  <species id="M_C00680_c"
name="meso-2,6-Diaminoheptanedioate|meso-2,6-Diaminopimelate|meso-2,6-Diaminopimelic
acid|meso-Diaminoheptanedioate|meso-2,6-diaminopimelate|meso-2,6-diaminoheptanedioate|mes
o-2-6-Diaminoheptanedioate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H14N2O4</p></html>
  </notes>
</species>
  <species id="M_C00683_c"
name="(S)-2-Methyl-3-oxopropanoyl-CoA|(S)-2-Methyl-3-oxopropionyl-CoA|(S)-Methylmalonyl
-CoA|(S)-Methylmalonyl-coenzyme
A|(S)-3-Oxo-2-methylpropanoyl-CoA|D-methylmalonyl-CoA|D-Methylmalonyl-CoA"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:

```

C25H36N7O19P3S</p></html>

</notes>

</species>

<species id="M\_C00688\_c" name="dTDP-4-dehydro-6-deoxy-L-mannose|dTDP-4-oxo-6-deoxy-L-mannose|dTDP-4-oxo-L-rhamnose" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C16H24N2O15P2</p></html>

</notes>

</species>

<species id="M\_C00689\_c" name="alpha,alpha'-Trehalose 6-phosphate|Trehalose 6-phosphate|trehalose 6-phosphate|D-trehalose-6-phosphate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C12H22O14P</p></html>

</notes>

</species>

<species id="M\_C00691\_c" name="2,4,6/3,5-Pentahydroxycyclohexanone|scyllo-Inosose|2-Inosose|2-inosose" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H10O6</p></html>

</notes>

</species>

<species id="M\_C00692\_c" name="UDP-N-acetylmuramoyl-L-alanyl-D-glutamate|udp-n-acetylmuramoyl-l-alanyl-d-glutamate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C28H39N5O23P2</p></html>

</notes>

</species>

<species id="M\_C00695\_c" name="3alpha,7alpha,12alpha-Trihydroxy-5beta-cholanate|Cholate|3alpha,7alpha,12alpha-Trihydroxy-5beta-cholanic acid|Cholic acid" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C24H39O5</p></html>

</notes>

</species>

<species id="M\_C00698\_c" name="Chloride|HCl|Cl-|Chloride ion|Hydrochloric acid|Hydrogen chloride|Hydrochloride" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Cl</p></html>

```

    </notes>
</species>
  <species id="M_C00700_c" name="XTP" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H12N4O15P3</p></html>
    </notes>
  </species>
  <species id="M_C00703_c" name="Hg2+|Mercury (charged +2)|Mercury(2+)|Mercuric ion"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Hg</p></html>
    </notes>
  </species>
  <species id="M_C00703_e" name="Hg2+|Mercury (charged +2)|Mercury(2+)|Mercuric ion,
extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Hg,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00704_c" name="O2.-|Superoxide
anion|Superoxide|O2-|Superoxideanion|superoxide" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: HO2</p></html>
    </notes>
  </species>
  <species id="M_C00705_c" name="dCDP|2'-Deoxycytidine diphosphate|2'-Deoxycytidine
5'-diphosphate|dcdp" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H13N3O10P2</p></html>
    </notes>
  </species>
  <species id="M_C00718_c" name="Amylose|Amylose
chain|(1,4-alpha-D-Glucosyl)n|(1,4-alpha-D-Glucosyl)n+1|1,4-alpha-D-Glucan|1,4-alpha-D-gluca
n|(1,4-alpha-D-glucosyl)(n+1)|(1,4-alpha-D-glucosyl)(n)|(1,4-alpha-D-Glucosyl)n-1|4- {(1,4)-alph
a-D-Glucosyl} (n-1)-D-glucose" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C30H52O26</p></html>
    </notes>
  </species>
  <species id="M_C00719_c" name="Betaine|Trimethylaminoacetate|Glycine
betaine|N,N,N-Trimethylglycine|Trimethylammonioacetate|betaine|BET" compartment="C_c">

```

```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H11NO2</p></html>
    </notes>
  </species>
  <species id="M_C00719_e" name="Betaine|Trimethylaminoacetate|Glycine
betaine|N,N,N-Trimethylglycine|Trimethylammonioacetate|betaine|BET,
extracellular"
compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H11NO2,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00721_c" name="Dextrin" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C36H62O31</p></html>
    </notes>
  </species>
  <species id="M_C00721_e" name="Dextrin, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C36H62O31,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00725_c" name="Lipoate|Lipoic acid|alpha-Lipoic acid|Thioctic acid"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H13O2S2</p></html>
    </notes>
  </species>
  <species id="M_C00725_e" name="Lipoate|Lipoic acid|alpha-Lipoic acid|Thioctic acid,
extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H13O2S2,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00740_c" name="D-Serine|d-serine" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H7NO3</p></html>
    </notes>
  </species>
  <species id="M_C00740_e" name="D-Serine|d-serine, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H7NO3,

```

extracellular</p></html>  
 </notes>  
</species>  
 <species id="M\_C00748\_c" name="Siroheme|siroheme" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C42H36FeN4O16</p></html>  
 </notes>  
</species>  
 <species id="M\_C00750\_c"  
 name="Spermine|N,N'-Bis(3-aminopropyl)-1,4-butanediamine|SPRM" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H30N4</p></html>  
 </notes>  
</species>  
 <species id="M\_C00785\_c" name="Urocanate|Urocanic acid|urocanate"  
 compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H5N2O2</p></html>  
 </notes>  
</species>  
 <species id="M\_C00787\_c" name="tRNA(Tyr)" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>  
 </notes>  
</species>  
 <species id="M\_C00794\_c" name="D-Sorbitol|D-Glucitol|L-Gulitol|Sorbitol|D-sorbitol"  
 compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H14O6</p></html>  
 </notes>  
</species>  
 <species id="M\_C00794\_e" name="D-Sorbitol|D-Glucitol|L-Gulitol|Sorbitol|D-sorbitol,  
 extracellular" compartment="C\_e">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H14O6,  
 extracellular</p></html>  
 </notes>  
</species>  
 <species id="M\_C00805\_c" name="Salicylate|o-Hydroxybenzoic acid|Salicylic  
 acid|SALC|salicylate" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H5O3</p></html>  
 </notes>

```

</species>
  <species id="M_C00810_c"
name="Acetoin|2-Acetoin|3-Hydroxybutan-2-one|3-Hydroxy-2-butanone|Dimethylketol|acetoin|2-
acetoin|ACTN|(R)-Acetoin|(R)-2-Acetoin|(R)-3-Hydroxy-2-butanone|(R)-Dimethylketol|(R)-3-Hy
droxybutan-2-one" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H8O2</p></html>
  </notes>
</species>
  <species id="M_C00810_e"
name="Acetoin|2-Acetoin|3-Hydroxybutan-2-one|3-Hydroxy-2-butanone|Dimethylketol|acetoin|2-
acetoin|ACTN|(R)-Acetoin|(R)-2-Acetoin|(R)-3-Hydroxy-2-butanone|(R)-Dimethylketol|(R)-3-Hy
droxybutan-2-one,extracellular" compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H8O2</p></html>
  </notes>
</species>
  <species id="M_C00817_c" name="D-Altronate|D-altronate|D-altronatete"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H11O7</p></html>
  </notes>
</species>
  <species id="M_C00818_c" name="D-Glucarate|D-Glucaric acid|L-Gularic acid|d-Saccharic
acid|D-Glucosaccharic acid|d-glucarate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H8O8</p></html>
  </notes>
</species>
  <species id="M_C00818_e" name="D-Glucarate|D-Glucaric acid|L-Gularic acid|d-Saccharic
acid|D-Glucosaccharic acid|d-glucarate, extracellular" compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H8O8,
extracellular</p></html>
  </notes>
</species>
  <species id="M_C00826_c" name="L-Arogenate|L-Arogenic acid|Pretyrosine|l-arogenate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H12NO5</p></html>
  </notes>
</species>
  <species id="M_C00828_c" name="mq17|Menaquinol
7|Menaquinone|Menatetrenone|menaquinone" compartment="C_c">

```

```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C46H66O2</p></html>
    </notes>
  </species>
  <species id="M_C00842_c"
name="dTDP-glucose|dTDP-D-glucose|dTDPglucose|dTDP-alpha-D-glucose|dtdp-d-glucose"
compartment="C_c">
    <notes>
      <html
xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C16H24N2O16P2</p></html>
    </notes>
  </species>
  <species id="M_C00855_c" name="D-Methionine|D-2-Amino-4-(methylthio)butyric
acid|d-methionine" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H11NO2S</p></html>
    </notes>
  </species>
  <species id="M_C00855_c" name="D-Methionine|D-2-Amino-4-(methylthio)butyric
acid|d-methionine, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H11NO2S,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00857_c"
name="Deamino-NAD+|Deamido-NAD+|Deamido-NAD|deamido-NAD+|deamido-nad"
compartment="C_c">
    <notes>
      <html
xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C21H24N6O15P2</p></html>
    </notes>
  </species>
  <species id="M_C00860_c" name="L-Histidinol|L-histidinol" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12N3O</p></html>
    </notes>
  </species>
  <species id="M_C00861_c" name="L-Rhamnulose" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O5</p></html>
    </notes>
  </species>
  <species id="M_C00864_c" name="Pantothenate|Pantothenic

```

acid|(R)-Pantothenate|R-Pantothenate|pantothenate|PAN" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>9</sub>H<sub>16</sub>NO<sub>5</sub></p></html>

</notes>

</species>

<species id="M\_C00864\_e" name="Pantothenate|Pantothenic acid|(R)-Pantothenate|R-Pantothenate|pantothenate|PAN, extracellular" compartment="C\_e">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>9</sub>H<sub>16</sub>NO<sub>5</sub>, extracellular</p></html>

</notes>

</species>

<species id="M\_C00870\_c" name="4-Nitrophenol|p-Nitrophenol|PNP|Niphen|4-Hydroxynitrobenzene" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>6</sub>H<sub>5</sub>NO<sub>3</sub></p></html>

</notes>

</species>

<species id="M\_C00877\_c" name="Crotonoyl-CoA|Crotonyl-CoA|2-Butenoyl-CoA|trans-But-2-enoyl-CoA|But-2-enoyl-CoA|crotonyl-coa" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>25</sub>H<sub>37</sub>N<sub>7</sub>O<sub>17</sub>P<sub>3</sub>S</p></html>

</notes>

</species>

<species id="M\_C00879\_c" name="D-Galactarate|D-Mucic acid|D-Galactaric acid|d-galactarate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>6</sub>H<sub>8</sub>O<sub>8</sub></p></html>

</notes>

</species>

<species id="M\_C00879\_e" name="D-Galactarate|D-Mucic acid|D-Galactaric acid|d-galactarate, extracellular" compartment="C\_e">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>6</sub>H<sub>8</sub>O<sub>8</sub>, extracellular</p></html>

</notes>

</species>

<species id="M\_C00881\_c" name="Deoxycytidine|2'-Deoxycytidine|deoxycytidine" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>9</sub>H<sub>13</sub>N<sub>3</sub>O<sub>4</sub></p></html>

</notes>



```

</species>
  <species id="M_C00881_e" name="Deoxycytidine|2'-Deoxycytidine|deoxycytidine,
extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H13N3O4,
extracellular</p></html>
    </notes>
</species>
  <species id="M_C00882_c" name="Dephospho-CoA|dephospho-CoA|dephospho-coa"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C21H33N7O13P2S</p></html>
    </notes>
</species>
  <species id="M_C00885_c" name="Isochorismate|Isochorismic acid|isochorismate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H8O6</p></html>
    </notes>
</species>
  <species id="M_C00886_c" name="L-Alanyl-tRNA|L-Alanyl-tRNA(Ala)"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C13H22NO11PR2(C5H8O6PR)n</p></html>
    </notes>
</species>
  <species id="M_C00898_c" name="(R,R)-Tartaric acid|(R,R)-Tartrate|L-Tartaric acid|Tartaric
acid|Tartrate|2,3-Dihydroxybutanedioic acid|(2R,3R)-Tartaric acid|(+-)-Tartaric
acid|L-tartrate|(S,S)-Tartaric acid|(S,S)-Tartrate|D-Tartrate|D-Tartaric acid|(2S,3S)-Tartaric
acid|(-)-Tartaric acid|L-tartarate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H4O6</p></html>
    </notes>
</species>
  <species id="M_C00898_e" name="(R,R)-Tartaric acid|(R,R)-Tartrate|L-Tartaric acid|Tartaric
acid|Tartrate|2,3-Dihydroxybutanedioic acid|(2R,3R)-Tartaric acid|(+-)-Tartaric
acid|L-tartrate|(S,S)-Tartaric acid|(S,S)-Tartrate|D-Tartrate|D-Tartaric acid|(2S,3S)-Tartaric
acid|(-)-Tartaric acid|L-tartarate, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H4O6,
extracellular</p></html>
    </notes>

```

```

</species>
<species id="M_C00900_c"
name="2-Acetolactate|(S)-2-Acetolactate|(S)-2-Hydroxy-2-methyl-3-oxobutanoate|S-2-Acetolactate|2-acetolactate|ALCTT|2-aceto-lactate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H7O4</p></html>
  </notes>
</species>
<species id="M_C00905_c" name="D-Fructuronate|D-fructuronate|D-Fructuronic acid"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9O7</p></html>
  </notes>
</species>
<species id="M_C00916_c" name="Cephalosporin C" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C16H20N3O8S</p></html>
  </notes>
</species>
<species id="M_C00919_c" name="Choline sulfate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H13NO4S</p></html>
  </notes>
</species>
<species id="M_C00919_e" name="Choline sulfate, extracellular" compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H13NO4S,
extracellular</p></html>
  </notes>
</species>
<species id="M_C00921_c"
name="Dihydropteroate|7,8-Dihydropteroate|dihydropteroate|7,8-dihydropteroate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C14H13N6O3</p></html>
  </notes>
</species>
<species id="M_C00931_c" name="Porphobilinogen|porphobilinogen" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H13N2O4</p></html>
  </notes>

```

```

</species>
  <species id="M_C00944_c" name="3-Dehydroquinate|5-Dehydroquinate|3-Dehydroquinic
acid|5-Dehydroquinic acid|3-dehydroquinate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H9O6</p></html>
    </notes>
  </species>
  <species id="M_C00946_c" name="Adenosine 2'-phosphate|2'-Adenylic
acid|Adenosine-2'-monophosphate|AMP 2'-phosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H13N5O7P</p></html>
    </notes>
  </species>
  <species id="M_C00946_e" name="Adenosine 2'-phosphate|2'-Adenylic
acid|Adenosine-2'-monophosphate|AMP 2'-phosphate, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H13N5O7P,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00954_c" name="Indole-3-acetate|Indole-3-acetic
acid|(Indol-3-yl)acetate|Indoleacetate|Indoleacetic acid" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H8NO2</p></html>
    </notes>
  </species>
  <species id="M_C00966_c" name="2-Dehydropantoate|2-dehydropantoate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9O4</p></html>
    </notes>
  </species>
  <species id="M_C00979_c"
name="O-Acetyl-L-serine|O3-Acetyl-L-serine|O-acetyl-L-serine|o-acetyl-l-serine"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H9NO4</p></html>
    </notes>
  </species>
  <species id="M_C00988_c" name="2-Phosphoglycolate|Phosphoglycolic
acid|2-phosphoglycolate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H3O6P</p></html>
    </notes>
  </species>

```

```

    </notes>
</species>
  <species id="M_C00988_e" name="2-Phosphoglycolate|Phosphoglycolic
acid|2-phosphoglycolate, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H3O6P,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C00993_c"
name="D-Alanyl-D-alanine|D-Ala-D-Ala|D-alanyl-D-alanine|d-alanyl-d-alanine"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12N2O3</p></html>
    </notes>
  </species>
  <species id="M_C01005_c"
name="phosphoserine|O-Phospho-L-serine|L-O-Phosphoserine|3-Phosphoserine|Dexfosfoserine|3-
phospho-serine" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H7NO6P</p></html>
    </notes>
  </species>
  <species id="M_C01005_e"
name="phosphoserine|O-Phospho-L-serine|L-O-Phosphoserine|3-Phosphoserine|Dexfosfoserine|3-
phospho-serine, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H7NO6P,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C01007_c" name="Reduced riboflavin" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C17H22N4O6</p></html>
    </notes>
  </species>
  <species id="M_C01010_c" name="Urea-1-carboxylate|Allophanate|Allophanic
acid|urea-1-carboxylate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H3N2O3</p></html>
    </notes>
  </species>
  <species id="M_C01019_c" name="6-Deoxy-L-galactose|L-Fucose" compartment="C_c">

```

```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O5</p></html>
    </notes>
  </species>
  <species id="M_C01019_e" name="6-Deoxy-L-galactose|L-Fucose, extracellular"
    compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O5,
      extracellular</p></html>
    </notes>
  </species>
  <species id="M_C01024_c" name="Hydroxymethylbilane|hydroxymethylbilane"
    compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
      C40H38N4O17</p></html>
    </notes>
  </species>
  <species id="M_C01035_c" name="4-Guanidinobutanoate|4-guanidinobutanoate"
    compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H11N3O2</p></html>
    </notes>
  </species>
  <species id="M_C01037_c"
    name="7,8-Diaminononanoate|7-8-Diaminononanoate|7,8-diaminononanoate"
    compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H21N2O2</p></html>
    </notes>
  </species>
  <species id="M_C01040_c"
    name="L-Gulono-1,4-lactone|L-Gulono-gamma-lactone|gamma-Gulonolactone|L-Gulonic acid
    gamma-lactone|L-Gulonolactone" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H10O6</p></html>
    </notes>
  </species>
  <species id="M_C01040_e"
    name="L-Gulono-1,4-lactone|L-Gulono-gamma-lactone|gamma-Gulonolactone|L-Gulonic acid
    gamma-lactone|L-Gulonolactone, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H10O6,
      extracellular</p></html>

```

```

    </notes>
</species>
  <species id="M_C01044_c" name="N-Formyl-L-aspartate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H5NO5</p></html>
    </notes>
  </species>
  <species id="M_C01045_c" name="N-Formyl-L-glutamate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H7NO5</p></html>
    </notes>
  </species>
  <species id="M_C01050_c" name="UDP-N-acetylmuramate|UDP-N-acetylmuramic
acid|UDP-MurNAc|udp-n-acetylmuramate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H28N3O19P2</p></html>
    </notes>
  </species>
  <species id="M_C01051_c" name="Uroporphyrinogen
III|UroporphyrinogenIII|uroporphyrinogen-iii" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C40H36N4O16</p></html>
    </notes>
  </species>
  <species id="M_C01063_c"
name="6-Carboxyhexanoyl-CoA|Pimeloyl-CoA|6-carboxyhexanoyl-coa" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C28H42N7O19P3S</p></html>
    </notes>
  </species>
  <species id="M_C01079_c" name="Protoporphyrinogen IX|ProtoporphyrinogenIX"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C34H38N4O4</p></html>
    </notes>
  </species>
  <species id="M_C01081_c" name="Thiamin monophosphate|Thiamine
monophosphate|Thiamin phosphate|Thiamine phosphate|TMP|Thiaminmonophosphate|thiamine
monophosphate|thiamine-phosphate" compartment="C_c">
    <notes>

```

```

    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C12H17N4O4PS</p></html>
  </notes>
</species>
  <species      id="M_C01081_e"          name="Thiamin      monophosphate|Thiamine
monophosphate|Thiamin  phosphate|Thiamine  phosphate|TMP|Thiaminmonophosphate|thiamine
monophosphate|thiamine-phosphate, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C12H17N4O4PS,
extracellular</p></html>
    </notes>
</species>
  <species                                            id="M_C01083_c"
name="alpha,alpha-Trehalose|alpha,alpha'-Trehalose|Trehalose|trehalose|TRHL"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C12H22O11</p></html>
    </notes>
</species>
  <species                                            id="M_C01083_e"
name="alpha,alpha-Trehalose|alpha,alpha'-Trehalose|Trehalose|trehalose|TRHL,      extracellular"
compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C12H22O11,
extracellular</p></html>
    </notes>
</species>
  <species      id="M_C01089_c"      name="(R)-3-Hydroxybutanoate|(R)-3-Hydroxybutanoic
acid|(R)-3-Hydroxybutyric acid|(r)-3-hydroxybutanoate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H7O3</p></html>
    </notes>
</species>
  <species      id="M_C01092_c"      name="8-Amino-7-oxononanoate|8-Amino-7-oxononanoic
acid|8-amino-7-oxononanoate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H17NO3</p></html>
    </notes>
</species>
  <species      id="M_C01094_c"          name="D-Fructose
1-phosphate|D-Fructose1-phosphate|D-fructose-1-phosphate|D-fructose      1-phosphate|Fructose
1-phosphate|fructose-1-phosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O9P</p></html>

```

```

    </notes>
</species>
  <species id="M_C01097_c" name="D-Tagatose 6-phosphate|D-tagatose 6-phosphate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O9P</p></html>
    </notes>
  </species>
  <species id="M_C01100_c" name="L-Histidinol
phosphate|L-histidinol-phosphate|l-histidinol-phosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C6H12N3O4P</p></html>
    </notes>
  </species>
  <species id="M_C01101_c" name="L-Ribulose 5-phosphate|L-ribulose-5-phosphate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O8P</p></html>
    </notes>
  </species>
  <species id="M_C01102_c"
name="O-Phospho-L-homoserine|O-phospho-L-homoserine|o-phospho-l-homoserine"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H9NO6P</p></html>
    </notes>
  </species>
  <species id="M_C01103_c" name="Orotidine 5'-phosphate|Orotidylic
acid|Orotidine5-phosphate|orotidine 5-phosphate|orotidine-5'-phosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H11N2O11P</p></html>
    </notes>
  </species>
  <species id="M_C01118_c" name="O-Succinyl-L-homoserine|O-succinyl-L-homoserine"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H12NO6</p></html>
    </notes>
  </species>
  <species id="M_C01131_c" name="L-Rhamnulose 1-phosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O8P</p></html>

```



```

    </notes>
</species>
    <species                                     id="M_C01132_c"
name="N-Acetyl-D-galactosamine|N-Acetyl-D-chondrosamine|2-Acetamido-2-deoxy-D-galactose
" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H15NO6</p></html>
    </notes>
</species>
    <species                                     id="M_C01134_c"                name="Pantetheine
4'-phosphate|4'-Phosphopantetheine|Phosphopantetheine|D-Pantetheine 4'-phosphate|pantetheine
4'-phosphate|Pantetheine4-phosphate" compartment="C_c">
    <notes>
    <html                                     xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C11H22N2O7PS</p></html>
    </notes>
</species>
    <species                                     id="M_C01137_c"
name="S-Adenosylmethioninamine|(5-Deoxy-5-adenosyl)(3-aminopropyl)methylsulfonium
salt|S-Adenosyl-(5')-3-methylthiopropylamine" compartment="C_c">
    <notes>
    <html                                     xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C14H24N6O3S</p></html>
    </notes>
</species>
    <species      id="M_C01142_c"                name="(3S)-3,6-Diaminohexanoate|L-beta-Lysine"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H15N2O2</p></html>
    </notes>
</species>
    <species id="M_C01144_c" name="(S)-3-Hydroxybutanoyl-CoA|(S)-3-Hydroxybutyryl-CoA"
compartment="C_c">
    <notes>
    <html                                     xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C25H39N7O18P3S</p></html>
    </notes>
</species>
    <species      id="M_C01146_c"                name="2-Hydroxy-3-oxopropanoate|Tartronate
semialdehyde|tartronate semialdehyde" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H3O4</p></html>
    </notes>
</species>

```

<species id="M\_C01161\_c" name="3,4-Dihydroxyphenylacetate|3,4-Dihydroxyphenylacetic acid|3,4-Dihydroxyphenyl acetate|3,4-Dihydroxyphenyl acetic acid|Homoprotocatechuate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>8</sub>H<sub>7</sub>O<sub>4</sub></p></html>

</notes>

</species>

<species id="M\_C01165\_c" name="L-Glutamate 5-semialdehyde|L-Glutamate gamma-semialdehyde|L-Glutamate5-semialdehyde|L-glutamate-gamma-semialdehyde|L-glutamate 5-semialdehyde|l-glutamate gamma-semialdehyde" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>5</sub>H<sub>9</sub>NO<sub>3</sub></p></html>

</notes>

</species>

<species id="M\_C01170\_c" name="UDP-N-acetyl-D-mannosamine" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>17</sub>H<sub>25</sub>N<sub>3</sub>O<sub>17</sub>P<sub>2</sub></p></html>

</notes>

</species>

<species id="M\_C01172\_c" name="beta-D-Glucose 6-phosphate|beta-D-glucose 6-phosphate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>6</sub>H<sub>12</sub>O<sub>9</sub>P</p></html>

</notes>

</species>

<species id="M\_C01177\_c" name="Inositol 1-phosphate|myo-Inositol 1-phosphate|1D-myo-Inositol 1-phosphate|D-myo-Inositol 1-phosphate|1D-myo-Inositol 1-monophosphate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>6</sub>H<sub>12</sub>O<sub>9</sub>P</p></html>

</notes>

</species>

<species id="M\_C01179\_c" name="3-(4-Hydroxyphenyl)pyruvate|4-Hydroxyphenylpyruvate|p-Hydroxyphenylpyruvic acid|3--4-Hydroxyphenylpyruvate|4-hydroxyphenylpyruvate|p-hydroxyphenylpyruvate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>9</sub>H<sub>7</sub>O<sub>4</sub></p></html>

</notes>

</species>

<species id="M\_C01180\_c" name="4-Methylthio-2-oxobutanoic acid|2-keto-4-methylthiobutyrate|4-Methylthio-2-oxobutanoate|4-methylthio 2-oxobutyrate" compartment="C\_c">

```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H7O3S</p></html>
    </notes>
  </species>
  <species id="M_C01181_c" name="4-Trimethylammoniobutanoate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H15NO2</p></html>
    </notes>
  </species>
  <species id="M_C01181_e" name="4-Trimethylammoniobutanoate, extracellular"
  compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H15NO2,
  extracellular</p></html>
    </notes>
  </species>
  <species id="M_C01185_c" name="Nicotinate D-ribonucleotide|beta-Nicotinate
  D-ribonucleotide|Nicotinate ribonucleotide|Nicotinic acid
  ribonucleotide|NicotinateD-ribonucleotide|nicotinate ribonucleotide" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
  C11H13NO9P</p></html>
    </notes>
  </species>
  <species id="M_C01204_c" name="myo-Inositol hexakisphosphate|Phytic
  acid|Phytate|1D-myo-Inositol 1,2,3,4,5,6-hexakisphosphate|D-myo-Inositol
  1,2,3,4,5,6-hexakisphosphate|myo-Inositol 1,2,3,4,5,6-hexakisphosphate|Inositol
  1,2,3,4,5,6-hexakisphosphate|1D-myo-Inositol hexakisphosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
  C6H12O24P6</p></html>
    </notes>
  </species>
  <species id="M_C01209_c" name="Malonyl-[acyl-carrier protein]|malonyl-[acyl-carrier
  protein]|Malonyl-acyl-carrierprotein-" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
  C14H22N2O10PRS</p></html>
    </notes>
  </species>
  <species id="M_C01212_c"
  name="UDP-N-acetylmuramoyl-L-alanine|udp-n-acetylmuramoyl-l-alanine"
  compartment="C_c">
    <notes>

```

```

    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C23H33N4O20P2</p></html>
    </notes>
</species>
    <species          id="M_C01219_c"          name="CDP-4-dehydro-6-deoxy-D-glucose"
compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C15H21N3O15P2</p></html>
        </notes>
    </species>
    <species id="M_C01230_c" name="all-trans-Hexaprenyl diphosphate" compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C30H50O7P2</p></html>
        </notes>
    </species>
    <species                                id="M_C01233_c"
name="sn-glycero-3-Phosphoethanolamine|Glycerophosphoethanolamine|sn-Glycero-3-phosphoet
hanolamine" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H14NO6P</p></html>
        </notes>
    </species>
    <species          id="M_C01236_c"          name="D-Glucono-1,5-lactone
6-phosphate|6-Phospho-D-glucono-1,5-lactone|6-phospho-D-glucono-1,5-lactone|D-glucono-1,5-l
actone 6-phosphate|6-phospho-D-glucono-1-5-lactone" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H10O9P</p></html>
        </notes>
    </species>
    <species          id="M_C01250_c"          name="N-Acetyl-L-glutamate
5-semialdehyde|2-Acetamido-5-oxopentanoate|N-acetyl-L-glutamate          5-semialdehyde"
compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H10NO4</p></html>
        </notes>
    </species>
    <species          id="M_C01267_c"          name="3-(Imidazol-4-yl)-2-oxopropyl
phosphate|Imidazole-acetol          phosphate|imidazole-acetol-
phosphate|imidazole-acetol-phosphate|3-(imidazol-4-yl)-2-oxopropyl          phosphate|imidazole
acetol-phosphate" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H8N2O5P</p></html>

```

</notes>

</species>

<species id="M\_C01268\_c" name="5-Amino-6-(5'-phosphoribosylamino)uracil|5-Amino-6-(riboseylamino)-2,4-(1H,3H)-pyrimidinedione 5'-phosphate|5-Amino-6-(5-phosphoribosylamino)uracil|5-Amino-6--5-phosphoribosylaminouracil|5-amino-6-(5-phosphoribosylamino)uracil|5-amino-6-(riboseylamino)-2,4-(1h,3h)-pyrimidinedione 5'-phosphate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H14N4O9P</p></html>

</notes>

</species>

<species id="M\_C01269\_c" name="5-O-(1-Carboxyvinyl)-3-phosphoshikimate|O5-(1-Carboxyvinyl)-3-phosphoshikimate|5-O--1-Carboxyvinyl-3-phosphoshikimate|5-O-(1-carboxyvinyl)-3-phosphoshikimate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H10O10P</p></html>

</notes>

</species>

<species id="M\_C01279\_c" name="4-Amino-5-hydroxymethyl-2-methylpyrimidine|Toxopyrimidine|4-Amino-2-methyl-5-pyrimidinemethanol" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9N3O</p></html>

</notes>

</species>

<species id="M\_C01289\_c" name="N-Acetyl-D-glucosaminyldiphosphoundecaprenol|Undecaprenyl diphospho N-acetyl-glucosamine" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C63H103NO12P2</p></html>

</notes>

</species>

<species id="M\_C01290\_c" name="beta-D-Galactosyl-1,4-beta-D-glucosylceramide|Lactosylceramide|Gal-beta1->4Glc-beta1->1'Cer|LacCer|Lactosyl-N-acylsphingosine|D-Galactosyl-1,4-beta-D-glucosylceramide" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C31H56NO13R</p></html>

```

    </notes>
</species>
    <species id="M_C01300_c"
name="2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine|2-amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine|2-Amino-4-hydroxy-6-hydroxymethyl-7-8-dihydropteridine|6-hydroxymethyl dihydropterin" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H9N5O2</p></html>
    </notes>
</species>
    <species id="M_C01302_c" name="1-(2-Carboxyphenylamino)-1'-deoxy-D-ribulose
5'-phosphate|1-(2-carboxyphenylamino)-1-deoxyribulose
5-phosphate|1-(2-Carboxyphenylamino)-1-deoxy-D-ribulose
5-phosphate|1--2-Carboxyphenylamino-1-deoxy-D-ribulose5-phosphate|1-(2-carboxyphenylamino)-1-deoxy-D-ribulose 5-phosphate" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C12H14NO9P</p></html>
    </notes>
</species>
    <species id="M_C01304_c"
name="2,5-Diamino-6-(5'-phosphoribosylamino)-4-pyrimidineone|2,5-Diamino-6-hydroxy-4-(5'-phosphoribosylamino)-pyrimidine|2-5-Diamino-6-hydroxy-4--5-phosphoribosylamino-pyrimidine|2,5-Diamino-6-(ribosylamino)-4-(3H)-pyrimidinone
5'-phosphate|2,5-diamino-6-(ribosylamino)-4-(3h)-pyrimidinone
5'-phosphate|2,5-diamino-6-hydroxy-4-(5-phosphoribosylamino)pyrimidine"
compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H15N5O8P</p></html>
    </notes>
</species>
    <species id="M_C01330_c" name="Sodium|Na+|na+" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Na</p></html>
    </notes>
</species>
    <species id="M_C01330_e" name="Sodium|Na+|na+, extracellular" compartment="C_e">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Na,
extracellular</p></html>
    </notes>
</species>
    <species id="M_C01337_c" name="XDP" compartment="C_c">

```

```

      <notes>
        <html
          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H12N4O12P2</p></html>
        </notes>
      </species>
      <species id="M_C01344_c" name="dIDP|2'-Deoxyinosine-5'-diphosphate|2'-Deoxyinosine
5'-diphosphate" compartment="C_c">
        <notes>
          <html
            xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H12N4O10P2</p></html>
          </notes>
        </species>
        <species id="M_C01345_c" name="dITP|2'-Deoxyinosine-5'-triphosphate|2'-Deoxyinosine
5'-triphosphate" compartment="C_c">
          <notes>
            <html
              xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H12N4O13P3</p></html>
            </notes>
          </species>
          <species id="M_C01346_c" name="dUDP|2'-Deoxyuridine 5'-diphosphate|dudp"
compartment="C_c">
            <notes>
              <html
                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H12N2O11P2</p></html>
              </notes>
            </species>
            <species id="M_C01352_c" name="FADH2|Flavin adenine dinucleotide
reduced|Flavinadeninedinucleotidereduced|fadh2" compartment="C_c">
              <notes>
                <html
                  xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C27H33N9O15P2</p></html>
                </notes>
              </species>
              <species id="M_C01367_c" name="3'-AMP|3'-Adenylic acid|3'-Adenosine
monophosphate|Adenosine-3'-monophosphate|Adenosine 3'-phosphate|AMP 3'-phosphate"
compartment="C_c">
                <notes>
                  <html
                    xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H13N5O7P</p></html>
                  </notes>
                </species>
                <species id="M_C01367_e" name="3'-AMP|3'-Adenylic acid|3'-Adenosine
monophosphate|Adenosine-3'-monophosphate|Adenosine 3'-phosphate|AMP 3'-phosphate,
extracellular" compartment="C_e">

```

```

    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C10H13N5O7P,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C01368_c" name="3'-UMP|Uridine 3'-monophosphate|Uridine 3'-phosphate"
compartment="C_c">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H12N2O9P</p></html>
    </notes>
  </species>
  <species id="M_C01368_e" name="3'-UMP|Uridine 3'-monophosphate|Uridine 3'-phosphate,
extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C9H12N2O9P,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C01412_c" name="Butanal|Butyraldehyde" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H8O</p></html>
    </notes>
  </species>
  <species id="M_C01413_c" name="Cadmium|Cd2+" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Cd</p></html>
    </notes>
  </species>
  <species id="M_C01413_e" name="Cadmium|Cd2+, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      Cd,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C01419_c" name="Cys-Gly|L-Cysteinyglycine" compartment="C_c">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C5H10N2O3S</p></html>
    </notes>
  </species>
  <species      id="M_C01419_e"      name="Cys-Gly|L-Cysteinyglycine,      extracellular"
compartment="C_e">
    <notes>

```



```

    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C5H10N2O3S,
extracellular</p></html>
    </notes>
</species>
    <species id="M_C01451_c" name="Salicin|Salicoside|salicin" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C13H18O7</p></html>
    </notes>
</species>
    <species      id="M_C01451_e"      name="Salicin|Salicoside|salicin,      extracellular"
compartment="C_e">
    <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C13H18O7,
extracellular</p></html>
    </notes>
</species>
    <species id="M_C01487_c" name="D-Allose" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O6</p></html>
    </notes>
</species>
    <species id="M_C01487_e" name="D-Allose, extracellular" compartment="C_e">
    <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C6H12O6,
extracellular</p></html>
    </notes>
</species>
    <species      id="M_C01530_c"      name="Octadecanoic      acid|Stearate|Stearic
acid|octadecanoate|stearate" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C18H35O2</p></html>
    </notes>
</species>
    <species      id="M_C01563_c"      name="Carbamate|Carbamic      acid|Aminoformic      acid"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: CH2NO2</p></html>
    </notes>
</species>
    <species id="M_C01610_c" name="Puromycin" compartment="C_c">
    <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C22H30N7O5</p></html>
    </notes>

```

```

</species>
  <species id="M_C01610_e" name="Puromycin, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C22H30N7O5,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C01613_c" name="Stachyose" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C24H42O21</p></html>
    </notes>
  </species>
  <species id="M_C01613_e" name="Stachyose, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C24H42O21,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C01635_c" name="tRNA(Ala)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
    </notes>
  </species>
  <species id="M_C01636_c" name="L-Alanyl-tRNA|L-Alanyl-tRNA(Ala)"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C13H22NO11PR2(C5H8O6PR)n</p></html>
    </notes>
  </species>
  <species id="M_C01637_c" name="tRNA(Asn)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
    </notes>
  </species>
  <species id="M_C01638_c" name="tRNA(Asp)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
    </notes>
  </species>
  <species id="M_C01639_c" name="tRNA(Cys)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
    </notes>
  </species>

```

```

</species>
  <species id="M_C01640_c" name="tRNA(Gln)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
    </notes>
  </species>
  <species id="M_C01641_c" name="tRNA(Glu)|tRNA (Glu)|tRNA-Glu"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H12N5O3R</p></html>
    </notes>
  </species>
  <species id="M_C01642_c" name="tRNA(Gly)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
    </notes>
  </species>
  <species id="M_C01643_c" name="tRNA(His)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
    </notes>
  </species>
  <species id="M_C01644_c" name="tRNA(Ile)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
    </notes>
  </species>
  <species id="M_C01645_c" name="tRNA(Leu)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
    </notes>
  </species>
  <species id="M_C01646_c" name="tRNA(Lys)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
    </notes>
  </species>
  <species id="M_C01647_c" name="tRNA(Met)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
    </notes>
  </species>
  <species id="M_C01648_c" name="tRNA(Phe)" compartment="C_c">

```

```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
    </notes>
  </species>
  <species id="M_C01649_c" name="tRNA(Pro)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
    </notes>
  </species>
  <species id="M_C01650_c" name="tRNA(Ser)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
    </notes>
  </species>
  <species id="M_C01651_c" name="tRNA(Thr)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
    </notes>
  </species>
  <species id="M_C01652_c" name="tRNA(Trp)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
    </notes>
  </species>
  <species id="M_C01653_c" name="tRNA(Val)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
    </notes>
  </species>
  <species id="M_C01659_c" name="Acrylamide|2-Propenamide|acrylamide"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H5NO</p></html>
    </notes>
  </species>
  <species id="M_C01672_c"
name="Cadaverine|1,5-Pentanediamine|1,5-Diaminopentane|Pentamethylenediamine"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H16N2</p></html>
    </notes>
  </species>
  <species id="M_C01674_c" name="Chitobiose" compartment="C_c">
    <notes>

```

```

    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C16H28N2O11</p></html>
    </notes>
</species>
    <species id="M_C01697_c" name="Galactitol|Dulcitol|Dulcose" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H14O6</p></html>
    </notes>
</species>
    <species      id="M_C01697_e"      name="Galactitol|Dulcitol|Dulcose,      extracellular"
compartment="C_e">
    <notes>
    <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          C6H14O6,
extracellular</p></html>
    </notes>
</species>
    <species id="M_C01722_c" name="L-Glucitol|L-Sorbitol|D-Gulitol" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H14O6</p></html>
    </notes>
</species>
    <species      id="M_C01722_e"      name="L-Glucitol|L-Sorbitol|D-Gulitol,      extracellular"
compartment="C_e">
    <notes>
    <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          C6H14O6,
extracellular</p></html>
    </notes>
</species>
    <species                                     id="M_C01742_c"
name="Palatinose|6-O-alpha-D-Glucopyranosyl-D-fructofuranose" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C12H22O11</p></html>
    </notes>
</species>
    <species                                     id="M_C01742_e"
name="Palatinose|6-O-alpha-D-Glucopyranosyl-D-fructofuranose,                                     extracellular"
compartment="C_e">
    <notes>
    <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          C12H22O11,
extracellular</p></html>
    </notes>
</species>
    <species id="M_C01762_c" name="Xanthosine|xanthosine" compartment="C_c">
    <notes>

```

```

        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H12N4O6</p></html>
    </notes>
</species>
    <species      id="M_C01762_e"      name="Xanthosine|xanthosine,      extracellular"
compartment="C_e">
    <notes>
        <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C10H12N4O6,
extracellular</p></html>
    </notes>
</species>
    <species id="M_C01769_c" name="(S)-acetoin" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H8O2</p></html>
    </notes>
</species>
    <species id="M_C01769_e" name="(S)-acetoin,extracellular" compartment="C_e">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H8O2</p></html>
    </notes>
</species>
    <species                                id="M_C01801_c"
name="Deoxyribose|2-Deoxy-beta-D-erythro-pentose|Thyminose|2-Deoxy-D-ribose|2-Deoxy-D-e
rythro-pentose" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O4</p></html>
    </notes>
</species>
    <species                                id="M_C01801_e"
name="Deoxyribose|2-Deoxy-beta-D-erythro-pentose|Thyminose|2-Deoxy-D-ribose|2-Deoxy-D-e
rythro-pentose, extracellular" compartment="C_e">
    <notes>
        <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C5H10O4,
extracellular</p></html>
    </notes>
</species>
    <species      id="M_C01832_c"      name="Lauroyl-CoA|Lauroyl      coenzyme
A|Dodecanoyl-CoA|ddcoa|Dodecanoyl-CoA      (n-C12:0CoA)|dodecanoyl-coa"
compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C33H55N7O17P3S</p></html>
    </notes>
</species>

```

```

<species id="M_C01835_c" name="Maltotriose|Amylotriose" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C18H32O16</p></html>
  </notes>
</species>
<species id="M_C01835_e" name="Maltotriose|Amylotriose, extracellular"
compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C18H32O16,
extracellular</p></html>
  </notes>
</species>
<species id="M_C01847_c" name="flavin mononucleotide reduced|Reduced
FMN|FMNH2|ReducedFMN|fmnh2" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C17H22N4O9P</p></html>
  </notes>
</species>
<species id="M_C01879_c" name="5-Oxoproline|Pyroglutamic
acid|5-Pyrrolidone-2-carboxylic acid|Pyroglutamate|5-Oxo-L-proline|L-Pyroglutamic
acid|L-5-Pyrrolidone-2-carboxylic acid" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H6NO3</p></html>
  </notes>
</species>
<species id="M_C01879_e" name="5-Oxoproline|Pyroglutamic
acid|5-Pyrrolidone-2-carboxylic acid|Pyroglutamate|5-Oxo-L-proline|L-Pyroglutamic
acid|L-5-Pyrrolidone-2-carboxylic acid, extracellular" compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H6NO3,
extracellular</p></html>
  </notes>
</species>
<species id="M_C01888_c" name="Aminoacetone|1-Amino-2-propanone"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H8NO</p></html>
  </notes>
</species>
<species id="M_C01909_c" name="Dethiobiotin|Desthiobiotin|dethiobiotin"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:

```

C10H17N2O3</p></html>  
 </notes>  
 </species>  
 <species id="M\_C01921\_c" name="Glycocholate|Glycocholic acid|3alpha,7alpha,12alpha-Trihydroxy-5beta-cholan-24-oylglycine" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C26H42NO6</p></html>  
 </notes>  
 </species>  
 <species id="M\_C01929\_c" name="L-Histidinal|L-histidinal" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H10N3O</p></html>  
 </notes>  
 </species>  
 <species id="M\_C01931\_c" name="L-Lysyl-tRNA|L-Lysyl-tRNA(Lys)" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C16H29N2O11PR2(C5H8O6PR)n</p></html>  
 </notes>  
 </species>  
 <species id="M\_C01944\_c" name="Octanoyl-CoA|Octanoyl-CoA (n-C8:0CoA)|octanoyl-coa" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C29H47N7O17P3S</p></html>  
 </notes>  
 </species>  
 <species id="M\_C02047\_c" name="L-Leucyl-tRNA|L-Leucyl-tRNA(Leu)" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C21H32N6O11PR(C5H8O6PR)n</p></html>  
 </notes>  
 </species>  
 <species id="M\_C02086\_c" name="Thioglycolate|Mercaptoacetic acid|Mercaptoethanoic acid|Thioglycolic acid" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H3O2S</p></html>  
 </notes>  
 </species>  
 <species id="M\_C02086\_e" name="Thioglycolate|Mercaptoacetic acid|Mercaptoethanoic acid|Thioglycolic acid, extracellular" compartment="C\_e">  
 <notes>



```

        <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:          C2H3O2S,
extracellular</p></html>
    </notes>
</species>
    <species id="M_C02091_c" name="Ureidoglycine|ureidoglycine" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H7N3O3</p></html>
    </notes>
</species>
    <species id="M_C02130_c" name="Acetyl-maltose" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C14H24O12</p></html>
    </notes>
</species>
    <species          id="M_C02163_c"          name="L-Arginyl-tRNA(Arg)|L-Arginyl-tRNA"
compartment="C_c">
    <notes>
        <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C21H33N9O11PR(C5H8O6PR)n</p></html>
    </notes>
</species>
    <species id="M_C02166_c" name="Leukotriene C4" compartment="C_c">
    <notes>
        <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C30H45N3O9S</p></html>
    </notes>
</species>
    <species id="M_C02191_c" name="Protoporphyrin|Protoporphyrin IX|Porphyrinogen
IX|protoporphyrin ix" compartment="C_c">
    <notes>
        <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C34H32N4O4</p></html>
    </notes>
</species>
    <species          id="M_C02225_c"
name="2-Methylcitrate|2-Hydroxybutane-1,2,3-tricarboxylate|(2R,3S)-2-Hydroxybutane-1,2,3-tri
carboxylate|2-methyl-citrate|2-methylcitrate" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H7O7</p></html>
    </notes>
</species>
    <species id="M_C02232_c" name="3-Oxoadipyl-CoA" compartment="C_c">
    <notes>
        <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:

```

C27H38N7O20P3S</p></html>

</notes>

</species>

<species id="M\_C02265\_c" name="D-Phenylalanine|D-alpha-Amino-beta-phenylpropionic acid" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H11NO2</p></html>

</notes>

</species>

<species id="M\_C02282\_c" name="GlutaminyI-tRNA|L-GlutaminyI-tRNA(Gln)|GlutaminyI-tRNA(Gln)|Gln-tRNA(Gln)" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C20H29N7O12PR(C5H8O6PR)n</p></html>

</notes>

</species>

<species id="M\_C02291\_c" name="Cystathionine|L-Cystathionine|cystathionine" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H14N2O4S</p></html>

</notes>

</species>

<species id="M\_C02315\_c" name="Protein dithiol" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H11N3O3R2S2</p></html>

</notes>

</species>

<species id="M\_C02323\_c" name="Salicyl alcohol|Saligenin|2-Hydroxybenzyl alcohol|2-(Hydroxymethyl)phenol|2-(hydroxymethyl)phenol|salicyl alcohol" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H8O2</p></html>

</notes>

</species>

<species id="M\_C02323\_e" name="Salicyl alcohol|Saligenin|2-Hydroxybenzyl alcohol|2-(Hydroxymethyl)phenol|2-(hydroxymethyl)phenol|salicyl alcohol, extracellular" compartment="C\_e">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H8O2, extracellular</p></html>

</notes>

```

</species>
  <species id="M_C02330_c" name="UDP-L-iduronate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C15H19N2O18P2</p></html>
    </notes>
  </species>
  <species id="M_C02348_c" name="(R)(-)-Allantoin|(R)-Allantoin" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H6N4O3</p></html>
    </notes>
  </species>
  <species id="M_C02350_c" name="Allantoin|(S)-Allantoin|5-Ureidohydantoin|Glyoxyldiureide|(S)(+)-Allantoin|allantoin" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H6N4O3</p></html>
    </notes>
  </species>
  <species id="M_C02350_e" name="Allantoin|(S)-Allantoin|5-Ureidohydantoin|Glyoxyldiureide|(S)(+)-Allantoin|allantoin, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H6N4O3, extracellular</p></html>
    </notes>
  </species>
  <species id="M_C02353_c" name="2',3'-Cyclic AMP" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H11N5O6P</p></html>
    </notes>
  </species>
  <species id="M_C02353_e" name="2',3'-Cyclic AMP, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H11N5O6P, extracellular</p></html>
    </notes>
  </species>
  <species id="M_C02354_c" name="2',3'-Cyclic CMP" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H11N3O7P</p></html>
    </notes>
  </species>

```

```

</species>
  <species id="M_C02354_e" name="2',3'-Cyclic CMP, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C9H11N3O7P,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C02355_c" name="2',3'-Cyclic UMP" compartment="C_c">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H10N2O8P</p></html>
    </notes>
  </species>
  <species id="M_C02355_e" name="2',3'-Cyclic UMP, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C9H10N2O8P,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C02412_c" name="Glycyl-tRNA(Gly)" compartment="C_c">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C12H20NO11PR2(C5H8O6PR)n</p></html>
    </notes>
  </species>
  <species      id="M_C02430_c"      name="L-Methionyl-tRNA|L-Methionyl-tRNA(Met)"
compartment="C_c">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H30N6O11PSR(C5H8O6PR)n</p></html>
    </notes>
  </species>
  <species      id="M_C02463_c"      name="Precorrin
2|Dihydrosirohydrochlorin|dihydrosirohydrochlorin" compartment="C_c">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C42H40N4O16</p></html>
    </notes>
  </species>
  <species id="M_C02466_c" name="Trimetaphosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: O9P3</p></html>
    </notes>
  </species>

```

```

    <species id="M_C02466_e" name="Trimetaphosphate, extracellular" compartment="C_e">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: O9P3,
extracellular</p></html>
      </notes>
    </species>
    <species id="M_C02474_c" name="alpha-L-Arabinan|alpha-L-Araban|Arabinan"
compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C15H26O13</p></html>
      </notes>
    </species>
    <species id="M_C02504_c"
name="(2S)-2-Isopropylmalate|2-Isopropylmalate|2-Isopropylmalic
acid|3-Carboxy-3-hydroxy-4-methylpentanoate|3-Carboxy-3-hydroxy-isocaproate|3-Carboxy-3-hy
droxyisocaproate|2-Hydroxy-2-isopropylbutanedioate|3-Hydroxy-4-methyl-3-carboxypentanoate|2
-isopropylmalate|3-carboxy-3-hydroxy-isocaproate" compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H10O5</p></html>
      </notes>
    </species>
    <species id="M_C02505_c" name="2-Phenylacetamide" compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H9NO</p></html>
      </notes>
    </species>
    <species id="M_C02512_c"
name="3-Cyano-L-alanine|L-3-Cyanoalanine|L-beta-Cyanoalanine" compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H6N2O2</p></html>
      </notes>
    </species>
    <species id="M_C02527_c" name="Butanoylphosphate|Butanoyl phosphate"
compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H8O5P</p></html>
      </notes>
    </species>
    <species id="M_C02528_c" name="Chenodeoxycholate|Chenodeoxycholic
acid|3alpha,7alpha-Dihydroxy-5beta-cholanic acid|Chenodiol" compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C24H39O4</p></html>
      </notes>
    </species>

```

```

<species id="M_C02532_c" name="D-O-Phosphoserine" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H7NO6P</p></html>
  </notes>
</species>
<species id="M_C02532_e" name="D-O-Phosphoserine, extracellular" compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H7NO6P,
extracellular</p></html>
  </notes>
</species>
<species id="M_C02553_c" name="L-Seryl-tRNA(Ser)" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C13H22NO12PR2(C5H8O6PR)n</p></html>
  </notes>
</species>
<species id="M_C02554_c" name="L-Valyl-tRNA(Val)" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H30N6O11PR(C5H8O6PR)n</p></html>
  </notes>
</species>
<species id="M_C02582_c" name="Protein disulfide" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C7H9N3O3R2S2</p></html>
  </notes>
</species>
<species id="M_C02593_c" name="Tetradecanoyl-CoA|Myristoyl-CoA|Tetradecanoyl-CoA
(n-C14:0CoA)|tetradecanoyl-coa" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C35H59N7O17P3S</p></html>
  </notes>
</species>
<species id="M_C02631_c"
name="2-Isopropylmaleate|beta-Isopropylmaleate|2-isopropylmaleate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H8O4</p></html>
  </notes>
</species>
<species id="M_C02637_c"
name="3-Dehydroshikimate|3-dehydroshikimate|3-dehydro-shikimate" compartment="C_c">

```

```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H7O5</p></html>
    </notes>
  </species>
  <species id="M_C02656_c" name="6-Carboxyhexanoate|Pimelate|Pimelic acid|Heptanedioic
acid|pimelate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H10O4</p></html>
    </notes>
  </species>
  <species id="M_C02693_c" name="Indole-3-acetamide" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H10N2O</p></html>
    </notes>
  </species>
  <species id="M_C02702_c" name="L-Prolyl-tRNA(Pro)" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C15H24NO11PR2(C5H8O6PR)n</p></html>
    </notes>
  </species>
  <species
    id="M_C02720_c"
name="N-Hydroxyarylamine|Hydroxylaminobenzene|(Hydroxyamino)benzene"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H7NO</p></html>
    </notes>
  </species>
  <species
    id="M_C02730_c"
name="2-Succinylbenzoate|o-Succinylbenzoate|Succinylbenzoate|2-succinylbenzoate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C11H8O5</p></html>
    </notes>
  </species>
  <species
    id="M_C02739_c"
name="Phosphoribosyl-ATP|N1-(5-Phospho-D-ribose)-ATP|1-(5-Phosphoribosyl)-ATP|phosphori
bosyl-ATP|1-(5-phospho-D-ribose)-ATP|1-(5-Phospho-D-ribose)-ATP|phosphoribosyl-atp"
compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C15H21N5O20P4</p></html>
    </notes>
  </species>

```

```

    <species id="M_C02741_c"
name="Phosphoribosyl-AMP|N1-(5-Phospho-D-ribosyl)-AMP|1-(5-Phosphoribosyl)-AMP|phosp
horibosyl-AMP|phosphoribosyl-amp|1-(5-phospho-D-ribosyl)-AMP" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C15H21N5O14P2</p></html>
    </notes>
</species>
    <species id="M_C02835_c" name="Imidazole-4-acetate|Imidazoleacetic
acid|4-Imidazoleacetate" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H5N2O2</p></html>
    </notes>
</species>
    <species id="M_C02839_c" name="L-Tyrosyl-tRNA(Tyr)" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C24H30N6O12PR(C5H8O6PR)n</p></html>
    </notes>
</species>
    <species id="M_C02876_c" name="Propanoyl phosphate|Propionyl phosphate"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H6O5P</p></html>
    </notes>
</species>
    <species id="M_C02923_c" name="2,3-Dihydroxytoluene|3-Methylcatechol"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H8O2</p></html>
    </notes>
</species>
    <species id="M_C02939_c" name="3-Methylbutanoyl-CoA|Isovaleryl-CoA|isovaleryl-CoA"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C26H41N7O17P3S</p></html>
    </notes>
</species>
    <species id="M_C02949_c" name="4-Hydroxybenzoyl-CoA" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C28H37N7O18P3S</p></html>
    </notes>

```



```

</species>
  <species id="M_C02984_c" name="L-Aspartyl-tRNA(Asp)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C14H22NO13PR2(C5H8O6PR)n</p></html>
    </notes>
  </species>
  <species id="M_C02987_c" name="L-Glutamyl-tRNA(Glu)|L-Glutamyl-tRNA-Glu"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C15H19N6O6R</p></html>
    </notes>
  </species>
  <species id="M_C02988_c" name="L-Histidyl-tRNA(His)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C16H24N3O11PR2(C5H8O6PR)n</p></html>
    </notes>
  </species>
  <species id="M_C02989_c" name="L-Methionine S-oxide" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H11NO3S</p></html>
    </notes>
  </species>
  <species id="M_C02992_c" name="L-Threonyl-tRNA(Thr)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C14H24NO12PR2(C5H8O6PR)n</p></html>
    </notes>
  </species>
  <species id="M_C02995_c" name="Maltose 6'-phosphate|D-maltose-6-phosphate|Maltose
6-phosphate|maltose-6-phosphate|maltose 6-phosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C12H22O14P</p></html>
    </notes>
  </species>
  <species id="M_C02999_c"
name="N-Acetylmuramoyl-Ala|N-Acetyl-D-muramoyl-L-alanine" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C14H23N2O9</p></html>
    </notes>
  </species>

```

```

</species>
  <species id="M_C03012_c"
name="Naphthalene-1,2-diol|1,2-Naphthalenediol|beta-Naphthohydroquinone|1,2-Dihydroxynaphthalene" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H8O2</p></html>
    </notes>
  </species>
  <species id="M_C03031_c" name="Uridine 2'-phosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H12N2O9P</p></html>
    </notes>
  </species>
  <species id="M_C03031_e" name="Uridine 2'-phosphate, extracellular"
compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H12N2O9P,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C03044_c"
name="(R,R)-Butane-2,3-diol|(R,R)-2,3-Butanediol|(R,R)-2,3-Butylene glycol|(R,R)-butane-2,3-diol|BDOH" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H10O2</p></html>
    </notes>
  </species>
  <species id="M_C03044_e"
name="(R,R)-Butane-2,3-diol|(R,R)-2,3-Butanediol|(R,R)-2,3-Butylene glycol|(R,R)-butane-2,3-diol|BDOH, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H10O2,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C03069_c"
name="3-Methylcrotonyl-CoA|3-Methylbut-2-enoyl-CoA|3-Methylcrotonoyl-CoA|Dimethylacryloyl-CoA|3-methylcrotonyl-CoA" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C26H39N7O17P3S</p></html>
    </notes>
  </species>

```

```

<species id="M_C03078_c" name="4-Guanidinobutanamide" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H13N4O</p></html>
  </notes>
</species>
<species id="M_C03082_c" name="4-Phospho-L-aspartate|L-4-Aspartyl
phosphate|4-phospho-L-aspartate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H7NO7P</p></html>
  </notes>
</species>
<species id="M_C03089_c"
name="5-Methylthio-D-ribose|S-Methyl-5-thio-D-ribose|methylthioribose" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O4S</p></html>
  </notes>
</species>
<species id="M_C03089_e"
name="5-Methylthio-D-ribose|S-Methyl-5-thio-D-ribose|methylthioribose, extracellular"
compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O4S,
extracellular</p></html>
  </notes>
</species>
<species id="M_C03090_c"
name="5-Phosphoribosylamine|5-Phospho-beta-D-ribosylamine|5-Phospho-D-ribosylamine|5-Pho
sphoribosyl-1-amine|5-phospho-beta-D-ribosylamine|5-phosphoribosylamine"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H12NO7P</p></html>
  </notes>
</species>
<species id="M_C03104_c" name="Cytidine 2'-phosphate|2'-Cytidylic acid|Cytidine
2'-monophosphate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H13N3O8P</p></html>
  </notes>
</species>
<species id="M_C03104_e" name="Cytidine 2'-phosphate|2'-Cytidylic acid|Cytidine
2'-monophosphate, extracellular" compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H13N3O8P,

```

extracellular</p></html>  
 </notes>  
</species>  
 <species id="M\_C03112\_c" name="Deacetylcephalosporin C" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C14H18N3O7S</p></html>  
 </notes>  
</species>  
 <species id="M\_C03125\_c" name="L-Cysteinyl-tRNA(Cys)" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C18H26N6O11PSR(C5H8O6PR)n</p></html>  
 </notes>  
</species>  
 <species id="M\_C03127\_c" name="L-Isoleucyl-tRNA(Ile)" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C21H32N6O11PR(C5H8O6PR)n</p></html>  
 </notes>  
</species>  
 <species id="M\_C03145\_c" name="N-Formyl-L-methionine" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H10NO3S</p></html>  
 </notes>  
</species>  
 <species id="M\_C03150\_c"  
 name="N-Ribosylnicotinamide|1-(beta-D-Ribofuranosyl)nicotinamide" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C11H15N2O5</p></html>  
 </notes>  
</species>  
 <species id="M\_C03160\_c"  
 name="2-Succinylbenzoyl-CoA|o-Succinylbenzoyl-CoA|Succinylbenzoyl-CoA|O-Succinylbenzoyl-CoA|2-succinylbenzoyl-CoA" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C32H40N7O20P3S</p></html>  
 </notes>  
</species>  
 <species id="M\_C03175\_c" name="Shikimate 3-phosphate|Shikimate 5-phosphate|Shikimate5-phosphate|shikimate-3-phosphate|3-phosphoshikimate" compartment="C\_c">

```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H9O8P</p></html>
    </notes>
  </species>
  <species id="M_C03203_c" name="1-Hydroxy-2-naphthoate|1-Hydroxy-2-naphthoic
acid|1-Naphthol-2-carboxylic acid" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C11H7O3</p></html>
    </notes>
  </species>
  <species id="M_C03221_c"
name="2-trans-Dodecenoyl-CoA|trans-Dodec-2-enoyl-CoA|(2E)-Dodec-2-enoyl-CoA|(2E)-Dodec
enoyl-CoA|trans-dodec-2-enoyl-coa" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C33H53N7O17P3S</p></html>
    </notes>
  </species>
  <species id="M_C03231_c"
name="3-Methylglutaconyl-CoA|trans-3-Methylglutaconyl-CoA|3-methylglutaconyl-CoA"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C27H38N7O19P3S</p></html>
    </notes>
  </species>
  <species id="M_C03232_c" name="3-Phosphonooxypyruvate|3-Phosphonooxypyruvic
acid|3-Phosphohydroxypyruvate|3-Phosphohydroxypyruvic
acid|3-phosphohydroxypyruvate|3-phospho-hydroxypyruvate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H3O7P</p></html>
    </notes>
  </species>
  <species id="M_C03239_c" name="6-Amino-2-oxohexanoate|2-Oxo-6-aminocaproate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H11NO3</p></html>
    </notes>
  </species>
  <species id="M_C03263_c" name="Coproporphyrinogen
III|CoproporphyrinogenIII|coproporphyrinogen iii" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C36H40N4O8</p></html>

```

```

    </notes>
</species>
  <species id="M_C03274_c" name="Glycerophosphoglycerol" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H14O8P</p></html>
    </notes>
  </species>
  <species id="M_C03287_c" name="L-Glutamyl 5-phosphate|L-Glutamate
5-phosphate|L-glutamate-5-phosphate|l-glutamate-5-phosphate|L-gamma-glutamyl 5-phosphate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H9NO7P</p></html>
    </notes>
  </species>
  <species id="M_C03294_c" name="N-Formylmethionyl-tRNA" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C21H30N6O12PSR(C5H8O6PR)n</p></html>
    </notes>
  </species>
  <species id="M_C03319_c" name="dTDP-6-deoxy-L-mannose|dTDP-L-rhamnose"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C16H26N2O15P2</p></html>
    </notes>
  </species>
  <species id="M_C03340_c" name="L-2,3-Dihydrodipicolinate|Dihydrodipicolinic
acid|Dihydrodipicolinate|2,3-Dihydrodipicolinate|2,3-dihydrodipicolinate|2-3-Dihydrodipicolinate
" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H5NO4</p></html>
    </notes>
  </species>
  <species id="M_C03344_c"
name="2-Methylacetoacetyl-CoA|2-Methyl-3-acetoacetyl-CoA|2-methyl-acetoacetyl-CoA"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C26H39N7O18P3S</p></html>
    </notes>
  </species>
  <species id="M_C03345_c"
name="2-Methylbut-2-enoyl-CoA|trans-2-Methylbut-2-enoyl-CoA|Tiglyl-CoA|(E)-2-Methylcroto

```

noyl-CoA|Methylcrotonoyl-CoA|Methylcrotonyl-CoA|Tigloyl-CoA|2-Methylcrotonoyl-CoA"

compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C26H39N7O17P3S</p></html>

</notes>

</species>

<species id="M\_C03360\_c" name="4-Nitrophenyl phosphate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H5NO6P</p></html>

</notes>

</species>

<species id="M\_C03373\_c" name="Aminoimidazole  
ribotide|AIR|1-(5'-Phosphoribosyl)-5-aminoimidazole|5'-Phosphoribosyl-5-aminoimidazole|1-(5-P  
hospho-D-ribosyl)-5-aminoimidazole|5-Amino-1-(5-phospho-D-ribosyl)imidazole|5-amino-1-(5-p  
hospho-D-ribosyl)imidazole|5-amino-1--5-phospho-D-ribosylimidazole|5'-phosphoribosyl-5-amin  
oimidazole|1-(5-phosphoribosyl)-5-aminoimidazole" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C8H14N3O7P</p></html>

</notes>

</species>

<species id="M\_C03402\_c"  
name="L-AsparaginyI-tRNA(Asn)|Asn-tRNA(Asn)|AsparaginyI-tRNA(Asn)"  
compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C14H23N2O12PR2(C5H8O6PR)n</p></html>

</notes>

</species>

<species id="M\_C03406\_c"  
name="N-(L-Arginino)succinate|N(omega)-(L-Arginino)succinate|L-Argininosuccinate|L-Arginin  
osuccinic acid|L-Arginosuccinic  
acid|N-omega-(L-Arginino)succinate|L-argininosuccinate|2-(Nomega-L-Arginino)succinate|l-argin  
ino-succinate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C10H17N4O6</p></html>

</notes>

</species>

<species id="M\_C03413\_c" name="N1,N12-Diacetylspermine" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C14H32N4O2</p></html>

```

    </notes>
</species>
  <species id="M_C03427_c" name="Prephytoene diphosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C40H66O7P2</p></html>
    </notes>
  </species>
  <species id="M_C03451_c" name="(R)-S-Lactoylglutathione" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C13H20N3O8S</p></html>
    </notes>
  </species>
  <species id="M_C03459_c" name="2-Hydroxy-3-oxosuccinate|Oxaloglycolate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H2O6</p></html>
    </notes>
  </species>
  <species id="M_C03460_c"
name="2-Methylprop-2-enoyl-CoA|Methacrylyl-CoA|Methylacrylyl-CoA|methylacrylyl-CoA"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C25H37N7O17P3S</p></html>
    </notes>
  </species>
  <species id="M_C03479_c"
name="5-Formyltetrahydrofolate|L(-)-5-Formyl-5,6,7,8-tetrahydrofolic acid|Folinic acid"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H21N7O7</p></html>
    </notes>
  </species>
  <species id="M_C03492_c"
name="D-4'-Phosphopantothenate|(R)-4'-Phosphopantothenate|D-4-Phosphopantothenate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H16NO8P</p></html>
    </notes>
  </species>
  <species id="M_C03506_c" name="Indoleglycerol phosphate|1-C-(Indol-3-yl)glycerol

```



3-phosphate|(3-Indolyl)-glycerol phosphate|C1-(3-Indolyl)-glycerol  
3-phosphate|(1S,2R)-1-C-(Indol-3-yl)glycerol 3-phosphate|Indole-3-glycerol  
phosphate|C'-(3-Indolyl)-glycerol  
3-phosphate|indole-3-glycerol-phosphate|C--3-Indolyl-glycerol3-phosphate|1-(indol-3-yl)glycerol  
3-phosphate" compartment="C\_c">  
<notes>  
<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C11H13NO6P</p></html>  
</notes>  
</species>  
<species id="M\_C03508\_c" name="L-2-Amino-3-oxobutanoic  
acid|L-2-Amino-3-oxobutanoate|L-2-Amino-acetoacetate|(S)-2-Amino-3-oxobutanoic acid"  
compartment="C\_c">  
<notes>  
<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H7NO3</p></html>  
</notes>  
</species>  
<species id="M\_C03511\_c" name="L-Phenylalanyl-tRNA(Phe)" compartment="C\_c">  
<notes>  
<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C19H26NO11PR2(C5H8O6PR)n</p></html>  
</notes>  
</species>  
<species id="M\_C03512\_c" name="L-Tryptophanyl-tRNA(Trp)" compartment="C\_c">  
<notes>  
<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C26H31N7O11PR(C5H8O6PR)n</p></html>  
</notes>  
</species>  
<species id="M\_C03539\_c"  
name="S-Ribosyl-L-homocysteine|S-D-Ribosyl-L-homocysteine|Ribose-5-S-homocysteine|S-Rib  
osylhomocysteine|S-(5-Deoxy-D-ribos-5-yl)-L-homocysteine|S-ribosyl-L-homocysteine|s-d-ribos  
yl-l-homocysteine" compartment="C\_c">  
<notes>  
<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H17NO6S</p></html>  
</notes>  
</species>  
<species id="M\_C03546\_c" name="myo-Inositol 4-phosphate|D-myo-Inositol  
4-phosphate|1D-myo-Inositol 4-phosphate|1D-myo-Inositol 4-monophosphate|Inositol  
4-phosphate" compartment="C\_c">  
<notes>  
<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O9P</p></html>  
</notes>  
</species>

```

    <species id="M_C03570_c" name="D-Mannosamine|2-Amino-2-deoxy-D-mannose"
    compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H14NO5</p></html>
      </notes>
    </species>
    <species id="M_C03570_e" name="D-Mannosamine|2-Amino-2-deoxy-D-mannose,
    extracellular" compartment="C_e">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H14NO5,
        extracellular</p></html>
      </notes>
    </species>
    <species id="M_C03619_c" name="Methyl beta-D-galactoside|Methyl
    beta-D-galactopyranoside" compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H14O6</p></html>
      </notes>
    </species>
    <species id="M_C03619_e" name="Methyl beta-D-galactoside|Methyl
    beta-D-galactopyranoside, extracellular" compartment="C_e">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H14O6,
        extracellular</p></html>
      </notes>
    </species>
    <species id="M_C03626_c"
    name="NG,NG-Dimethyl-L-arginine|Nomega, Nomega'-Dimethyl-L-arginine"
    compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H19N4O2</p></html>
      </notes>
    </species>
    <species id="M_C03657_c"
    name="1,4-Dihydroxy-2-naphthoate|1,4-dihydroxy-2-naphthoate|1-4-Dihydroxy-2-naphthoate"
    compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C11H7O4</p></html>
      </notes>
    </species>
    <species id="M_C03680_c" name="4-Imidazolone-5-propanoate|4-Imidazolone-5-propionic
    acid|4,5-Dihydro-4-oxo-5-imidazolepropanoate" compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H7N2O3</p></html>

```

```

    </notes>
</species>
    <species id="M_C03684_c"
name="6-Pyruvoyltetrahydropterin|6-(1,2-Dioxopropyl)-5,6,7,8-tetrahydropterin|6-Pyruvoyl-5,6,7,8-tetrahydropterin" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H11N5O3</p></html>
    </notes>
</species>
    <species id="M_C03688_c" name="Apo-[acyl-carrier-protein]|apo-ACP|apoprotein [acyl carrier protein]" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: HOR</p></html>
    </notes>
</species>
    <species id="M_C03722_c" name="Pyridine-2,3-dicarboxylate|Quinolinic acid|Quinolate|2,3-Pyridinedicarboxylic acid|quinolate" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H3NO4</p></html>
    </notes>
</species>
    <species id="M_C03741_c" name="(S)-4-Amino-5-oxopentanoate|L-Glutamate 1-semialdehyde|L-Glutamate 1-semialdehyde" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H9NO3</p></html>
    </notes>
</species>
    <species id="M_C03785_c" name="D-Tagatose 1,6-bisphosphate|D-tagatose 1,6-bisphosphate|D-Tagatose 1,6-biphosphate" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O12P2</p></html>
    </notes>
</species>
    <species id="M_C03794_c"
name="N6-(1,2-Dicarboxyethyl)-AMP|Adenylosuccinate|Adenylosuccinic acid|adenylosuccinate|N6--1-2-Dicarboxyethyl-AMP|adenylo-succinate" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C14H15N5O11P</p></html>
    </notes>
</species>
    <species id="M_C03838_c"
name="5'-Phosphoribosylglycinamide|GAR|N1-(5-Phospho-D-ribosyl)glycinamide|Glycinamide

```

ribonucleotide|N1--5-Phospho-D-ribosylglycinamide|5'-phosphoribosylglycinamide"  
 compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C7H15N2O8P</p></html>  
 </notes>  
</species>  
 <species id="M\_C03871\_c"  
 name="L-2-Amino-6-oxoheptanedioate|L-2-Amino-6-oxopimelate" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H10NO5</p></html>  
 </notes>  
</species>  
 <species id="M\_C03912\_c"  
 name="(S)-1-Pyrroline-5-carboxylate|L-1-Pyrroline-5-carboxylate|1-Pyrroline-5-carboxylate|1-py  
 rroline-5-carboxylate" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H6NO2</p></html>  
 </notes>  
</species>  
 <species id="M\_C03921\_c" name="2-Dehydro-3-deoxy-D-glucarate" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H6O7</p></html>  
 </notes>  
</species>  
 <species id="M\_C03939\_c" name="Acetyl-[acyl-carrier  
 protein]|Acetyl-ACP|acetyl-ACP|acetyl-acp" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C13H23N2O8PRS</p></html>  
 </notes>  
</species>  
 <species id="M\_C03972\_c"  
 name="2,3,4,5-Tetrahydrodipicolinate|delta 1-Piperidine-2,6-dicarboxylate|L-2,3,4,5-Tetrahydrodi  
 picolinate|(S)-2,3,4,5-Tetrahydropyridine-2,6-dicarboxylate|2-3-4-5-Tetrahydrodipicolinate|tetrahy  
 drodipicolinate" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H7NO4</p></html>  
 </notes>  
</species>  
 <species id="M\_C04006\_c" name="1D-myo-Inositol 3-phosphate|D-myo-Inositol  
 3-phosphate|myo-Inositol 3-phosphate|Inositol 3-phosphate|1D-myo-Inositol  
 3-monophosphate|D-myo-Inositol 3-monophosphate|myo-Inositol 3-monophosphate|Inositol  
 3-monophosphate|1L-myo-Inositol 1-phosphate|L-myo-Inositol 1-phosphate"

```

compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O9P</p></html>
  </notes>
</species>
  <species id="M_C04030_c" name="(2,3-Dihydroxybenzoyl)adenylate" compartment="C_c">
    <notes>
      <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C17H17N5O10P</p></html>
    </notes>
  </species>
  <species
                                id="M_C04039_c"
name="2,3-Dihydroxy-3-methylbutanoate|2,3-Dihydroxy-isovalerate|2,3-Dihydroxy-isovaleric
acid|2,3-dihydroxy-3-methylbutanoate|(R)-2,3-Dihydroxy-3-methylbutanoate|(R)-2,3-Dihydroxy-i
sovalerate|(R)-2,3-Dihydroxy-isovaleric
acid|(2R)-2,3-Dihydroxy-3-methylbutanoate|R-2-3-Dihydroxy-3-methylbutanoate|2,3-dihydroxy-i
sovalerate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H9O4</p></html>
    </notes>
  </species>
  <species
                                id="M_C04053_c"
name="5-Dehydro-4-deoxy-D-glucuronate|4-Deoxy-L-threo-5-hexosulose
urionate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H7O6</p></html>
    </notes>
  </species>
  <species id="M_C04076_c" name="L-2-Aminoadipate 6-semialdehyde|2-Aminoadipate
6-semialdehyde" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H11NO3</p></html>
    </notes>
  </species>
  <species
                                id="M_C04089_c"
name="UDP-4-dehydro-6-deoxy-D-glucose|UDP-4-keto-6-deoxy-D-glucose|UDP-4-oxo-6-deoxy
-D-glucose" compartment="C_c">
    <notes>
      <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C15H20N2O16P2</p></html>
    </notes>
  </species>
  <species
                                id="M_C04092_c"
name="1,2-Didehydropiperidine-2-carboxylate|delta1-Piperideine-2-carboxylate"

```

```

compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H8NO2</p></html>
  </notes>
</species>
  <species id="M_C04133_c" name="N-Acetyl-L-glutamate 5-phosphate|N-Acetyl-L-glutamyl
5-phosphate|N-acetyl-glutamyl-phosphate|N-acetyl-5-glutamyl
phosphate|n-acetylglutamyl-phosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H10NO8P</p></html>
    </notes>
  </species>
  <species id="M_C04144_c" name="Tetrahydropteroyltri-L-glutamate" compartment="C_c">
    <notes>
      <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C29H37N9O12</p></html>
    </notes>
  </species>
  <species
                                id="M_C04171_c"
name="2,3-Dihydro-2,3-dihydroxybenzoate|2,3-Dihydroxy-2,3-dihydrobenzoate|2,3-dihydro-2,3-
dihydroxybenzoate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H7O4</p></html>
    </notes>
  </species>
  <species
                                id="M_C04181_c"
                                name="3-Hydroxy-3-methyl-2-oxobutanoic
acid|3-Hydroxy-3-methyl-2-oxobutanoate|2-Oxo-3-hydroxyisovalerate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H7O4</p></html>
    </notes>
  </species>
  <species
                                id="M_C04188_c"
                                name="S-Methyl-5-thio-D-ribose
1-phosphate|5-Methylthio-5-deoxy-D-ribose
                                1-phosphate|S-Methyl-5-thio-alpha-D-ribose
1-phosphate|S-Methyl-5-thio-5-deoxy-D-ribose
1-phosphate|5-Methylthio-5-deoxy-D-ribose 1-phosphate|methylthioribose-1-phosphate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O7PS</p></html>
    </notes>
  </species>
  <species id="M_C04216_c" name="all-trans-Heptaprenyl diphosphate" compartment="C_c">
    <notes>
      <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C35H58O7P2</p></html>

```

```

    </notes>
</species>
  <species id="M_C04217_c" name="all-trans-Pentaprenyl diphosphate|pendp"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C25H42O7P2</p></html>
    </notes>
</species>
  <species id="M_C04225_c"
name="(Z)-But-2-ene-1,2,3-tricarboxylate|2-methyl-cis-aconitase|cis-2-Methyлаconitate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H5O6</p></html>
    </notes>
</species>
  <species id="M_C04236_c"
name="(2S)-2-Isopropyl-3-oxosuccinate|3-Carboxy-4-methyl-2-oxopentanoate|2-Oxo-4-methyl-3-
carboxypentanoate|2-isopropyl-3-oxosuccinate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H8O5</p></html>
    </notes>
</species>
  <species id="M_C04246_c" name="But-2-enoyl-[acyl-carrier protein]" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C15H25N2O8PRS</p></html>
    </notes>
</species>
  <species id="M_C04261_c" name="Protein N(pi)-phospho-L-histidine|Protein
N-pros-phospho-L-histidine|Protein N-pros-phosphohistidine|Protein Npi-phospho-L-histidine"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C7H9N4O5PR2</p></html>
    </notes>
</species>
  <species id="M_C04281_c"
name="L-1-Pyrroline-3-hydroxy-5-carboxylate|3-Hydroxy-L-1-pyrroline-5-carboxylate|(3R,5S)-1
-Pyrroline-3-hydroxy-5-carboxylate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H6NO3</p></html>
    </notes>
</species>

```

<species id="M\_C04287\_c" name="3,5/4-Trihydroxycyclohexa-1,2-dione|D-2,3-Diketo 4-deoxy-epi-inositol|DKDI|D-2,3-diketo-4-deoxy-epi-inositol|3D-(3,5/4)-Trihydroxycyclohexa-1, 2-dione|D-2,3-Diketo-4-deoxy-epi-inositol|(3R,4S,5R)-3,4,5-Trihydroxy-1,2-cyclohexanedione" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>6</sub>H<sub>8</sub>O<sub>5</sub></p></html>

</notes>

</species>

<species id="M\_C04294\_c" name="5-(2-Hydroxyethyl)-4-methylthiazole|4-Methyl-5-(2'-hydroxyethyl)-thiazole|4-Methyl-5-(2-hydroxyethyl)-thiazole|4-Methyl-5--2-hydroxyethyl-thiazole|4-methyl-5-(2-hydroxyethyl)-thiazole" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>6</sub>H<sub>9</sub>NOS</p></html>

</notes>

</species>

<species id="M\_C04302\_c" name="N-(5-Phospho-D-ribosyl)anthranilate|N-(5-Phospho-beta-D-ribosyl)anthranilate|N-(5-Phosphoribosyl)anthranilic acid|N--5-Phospho-D-ribosylanthranilate|N-5-phosphoribosyl-anthranilate|N-(5-phospho-beta-D-ribose)-anthranilate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>12</sub>H<sub>14</sub>NO<sub>9</sub>P</p></html>

</notes>

</species>

<species id="M\_C04327\_c" name="4-Methyl-5-(2-phosphoethyl)-thiazole|4-Methyl-5-(2-phosphono-oxyethyl)-thiazole|4-Methyl-5--2-phosphoethyl-thiazole|4-methyl-5-(2-phosphoethyl)-thiazole" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>6</sub>H<sub>9</sub>NO<sub>4</sub>PS</p></html>

</notes>

</species>

<species id="M\_C04332\_c" name="6,7-Dimethyl-8-(1-D-ribityl)lumazine|6,7-dimethyl-8-(1-D-ribityl)lumazine|6-7-Dimethyl-8--1-D-ribityllumazine|6,7-dimethyl-8-(1-d-ribityl)lumazine" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>13</sub>H<sub>18</sub>N<sub>4</sub>O<sub>6</sub></p></html>

</notes>

</species>

<species id="M\_C04349\_c" name="(4S)-4,6-Dihydroxy-2,5-dioxohexanoate|3-Deoxy-D-glycero-2,5-hexodiulosonate|2,5-Dik



eto-3-deoxy-D-gluconate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>6</sub>H<sub>7</sub>O<sub>6</sub></p></html>

</notes>

</species>

<species id="M\_C04352\_c"

name="(R)-4'-Phosphopantothienoyl-L-cysteine|N-((R)-4-Phosphopantothienoyl)-L-cysteine|N-[(R)-4'-Phosphopantothienoyl]-L-cysteine|N-(-R-4-Phosphopantothienoyl)-L-cysteine"

compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>12</sub>H<sub>21</sub>N<sub>2</sub>O<sub>9</sub>PS</p></html>

</notes>

</species>

<species id="M\_C04376\_c"

name="5'-Phosphoribosyl-N-formylglycinamide|N-Formyl-GAR|N-Formylglycinamide ribonucleotide|N2-Formyl-N1-(5-phospho-D-ribose)glycinamide|N2-Formyl-N1--5-phospho-D-ribose|glycinamide|5'-phosphoribosyl-N-formylglycinamide|5'-phosphoribosylformylglycinamide"

compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>8</sub>H<sub>14</sub>N<sub>2</sub>O<sub>9</sub>P</p></html>

</notes>

</species>

<species id="M\_C04390\_c"

name="N6-Acetyl-LL-2,6-diaminoheptanedioate|N2-Acetyl-LL-2,6-diaminoheptanedioate|N6-Acetyl-LL-2,6-diaminopimelate|N2-Acetyl-LL-2,6-diaminopimelate|N6-Acetyl-L-2,6-diaminoheptanedioate|N6-Acetyl-L-2,6-diaminopimelate|N-Acetyl-LL-2,6-diaminoheptanedioate|N-acetyl-LL-2,6-diaminopimelate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>9</sub>H<sub>15</sub>N<sub>2</sub>O<sub>5</sub></p></html>

</notes>

</species>

<species id="M\_C04405\_c"

name="(2S,3S)-3-Hydroxy-2-methylbutanoyl-CoA|(S)-3-Hydroxy-2-methylbutyryl-CoA"

compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>26</sub>H<sub>41</sub>N<sub>7</sub>O<sub>18</sub>P<sub>3</sub>S</p></html>

</notes>

</species>

<species id="M\_C04411\_c"

name="(2R,3S)-3-Isopropylmalate|3-Isopropylmalate|3-Carboxy-2-hydroxy-4-methylpentanoate|2-D-threo-Hydroxy-3-carboxy-isocaproate|3-isopropylmalate|2-d-threo-hydroxy-3-carboxy-isocapr

```

oate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H10O5</p></html>
  </notes>
</species>
  <species      id="M_C04419_c"      name="Carboxybiotin-carboxyl-carrier      protein"
compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C18H26N5O6R2S</p></html>
  </notes>
</species>
  <species      id="M_C04421_c"
name="N-Succinyl-LL-2,6-diaminoheptanedioate|N-Succinyl-LL-2,6-diaminopimelate|N-Succiny
l-L-2,6-diaminoheptanedioate|N-Succinyl-L-2,6-diaminopimelate|N-succinyl-LL-2,6-diaminohept
anedioate|N-Succinyl-LL-2-6-diaminoheptanedioate|n-succinyl-ll-2,6-diaminopimelate"
compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C11H16N2O7</p></html>
  </notes>
</species>
  <species      id="M_C04425_c"
name="S-Adenosyl-4-methylthio-2-oxobutanoate|s-adenosyl-4-methylthio-2-oxobutanoate"
compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C15H19N5O6S</p></html>
  </notes>
</species>
  <species      id="M_C04442_c"
name="2-Dehydro-3-deoxy-6-phospho-D-gluconate|6-Phospho-2-dehydro-3-deoxy-D-gluconate|2
-Keto-3-deoxy-6-phosphogluconate|2-Dehydro-3-deoxy-D-gluconate
6-phosphate|2-Dehydro-3-deoxy-D-gluconate6-phosphate|2-keto-3-deoxy-6-phosphogluconate|2-d
ehydro-3-deoxy-D-gluconate      6-phosphate|2-keto-3-deoxy-6-phospho-gluconate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9O9P</p></html>
  </notes>
</species>
  <species      id="M_C04454_c"
name="5-Amino-6-(5'-phosphoribitylamino)uracil|5-Amino-2,6-dioxy-4-(5'-phosphoribitylamino)
pyrimidine|5-Amino-6-(5-phosphoribitylamino)uracil|5-Amino-6--5-phosphoribitylaminouracil|5-
amino-6-(5-phosphoribitylamino)uracil|5-amino-2,6-dioxy-4-(5'-phosphoribitylamino)pyrimidine"

```

```

compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H16N4O9P</p></html>
    </notes>
</species>
  <species id="M_C04483_c" name="3alpha,12alpha-Dihydroxy-5beta-cholanate|Deoxycholic
acid|Deoxycholate|3alpha,12alpha-Dihydroxy-5beta-cholanic acid" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C24H39O4</p></html>
    </notes>
</species>
  <species id="M_C04489_c" name="5-Methyltetrahydropteroyltri-L-glutamate"
compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C30H39N9O12</p></html>
    </notes>
</species>
  <species id="M_C04494_c" name="Guanosine 3'-diphosphate 5'-triphosphate|Guanosine
5'-triphosphate,3'-diphosphate" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H13N5O20P5</p></html>
    </notes>
</species>
  <species id="M_C04501_c" name="N-Acetyl-D-glucosamine
1-phosphate|N-Acetyl-alpha-D-glucosamine
1-phosphate|N-Acetyl-D-glucosamine 1-phosphate|N-acetyl-alpha-D-glucosamine 1-phosphate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H15NO9P</p></html>
    </notes>
</species>
  <species id="M_C04524_c"
name="2-Protocatechoylphloroglucinolcarboxylate|2-(3,4-Dihydroxybenzoyloxy)-4,6-dihydroxyb
enzoate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C14H9O8</p></html>
    </notes>
</species>
  <species id="M_C04534_c"
name="6-Phospho-beta-D-glucosyl-(1,4)-D-glucose|cellobiose-6-phoshate|6-phospho-beta-D-gluc
oside-(1,4)-D-glucose|cellobiose 6-phoshate" compartment="C_c">

```

```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C12H22O14P</p></html>
    </notes>
  </species>
  <species id="M_C04556_c"
name="4-Amino-2-methyl-5-phosphomethylpyrimidine|4-Amino-5-phosphomethyl-2-methylpyri
midine|4-amino-2-methyl-5-phosphomethylpyrimidine" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9N3O4P</p></html>
    </notes>
  </species>
  <species id="M_C04563_c" name="D-myo-Inositol
1,2,4,5,6-pentakisphosphate|1D-myo-Inositol 1,2,4,5,6-pentakisphosphate|myo-Inositol
1,2,4,5,6-pentakisphosphate|Inositol 1,2,4,5,6-pentakisphosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C6H12O21P5</p></html>
    </notes>
  </species>
  <species id="M_C04574_c" name="Undecaprenyl
diphosphate|Undecaprenyldiphosphate|undecaprenyl diphosphate|di-trans,poly-cis-Undecaprenyl
diphosphate|Bactoprenyl diphosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C55H90O7P2</p></html>
    </notes>
  </species>
  <species id="M_C04582_c" name="S-Methyl-5-thio-D-ribulose
1-phosphate|5-Methylthio-5-deoxy-D-ribulose
1-phosphate|5-Methylthio-5-deoxy-D-ribulose1-phosphate|methylthioribulose-1-phosphate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O7PS</p></html>
    </notes>
  </species>
  <species id="M_C04593_c"
name="(2S,3R)-3-Hydroxybutane-1,2,3-tricarboxylate|Methylisocitrate|Methylisocitric
acid|methylisocitrate|(2S,3R)-3-hydroxybutane-1,2,3-tricarboxylate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H7O7</p></html>
    </notes>
  </species>
  <species id="M_C04618_c" name="(3R)-3-Hydroxybutanoyl-[acyl-carrier

```

protein]](R)-3-Hydroxybutanoyl-[acyl-carrier protein]" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C15H27N2O9PRS</p></html>

</notes>

</species>

<species id="M\_C04619\_c" name="(3R)-3-Hydroxydecanoyl-[acyl-carrier protein]](R)-3-Hydroxydecanoyl-[acyl-carrier protein]" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C21H39N2O9PRS</p></html>

</notes>

</species>

<species id="M\_C04620\_c" name="(3R)-3-Hydroxyoctanoyl-[acyl-carrier protein]](R)-3-Hydroxyoctanoyl-[acyl-carrier protein]" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C19H35N2O9PRS</p></html>

</notes>

</species>

<species id="M\_C04631\_c" name="UDP-N-acetyl-3-(1-carboxyvinyl)-D-glucosamine|UDP-N-acetyl-3-O-(1-carboxyvinyl)-D-glucosamine|UDP-N-acetylglucosamine-3-O-pyruvateether|UDP-N-acetylglucosamine enolpyruvate|UDP-N-acetyl-3-O--1-carboxyvinyl-D-glucosamine|udp-n-acetyl-3-(1-carboxyvinyl)-d-glucosamine" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C20H26N3O19P2</p></html>

</notes>

</species>

<species id="M\_C04633\_c" name="(3R)-3-Hydroxypalmitoyl-[acyl-carrier protein]](R)-3-Hydroxypalmitoyl-[acyl-carrier protein]](3R)-3-Hydroxyhexadecanoyl-[acyl-carrier protein]](R)-3-Hydroxyhexadecanoyl-[acyl-carrier protein]]R-3-hydroxypalmitoyl-[acyl-carrier protein]]R-3-hydroxypalmitoyl-acyl-carrierprotein-" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C27H51N2O9PRS</p></html>

</notes>

</species>

<species id="M\_C04640\_c" name="2-(Formamido)-N1-(5'-phosphoribosyl)acetamidine|1-(5'-Phosphoribosyl)-N-formylglycin amidine|5'-Phosphoribosyl-N-formylglycinamidine|5'-Phosphoribosylformylglycinamidine|2-(Formamido)-N1-(5-phospho-D-riboseyl)acetamidine|2--Formamido-N1-(5-phospho-D-riboseyl)acetamidine|5'-phosphoribosyl-N-formylglycinamidine|5'-phosphoribosylformylglycinamidine"

```

compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C8H16N3O8P</p></html>
    </notes>
</species>
  <species
    id="M_C04666_c"
    name="D-erythro-1-(Imidazol-4-yl)glycerol
3-phosphate|D-erythro-Imidazole-glycerol
3-phosphate|D-erythro-Imidazole-glycerol
phosphate|D-erythro-1-(imidazol-4-yl)glycerol
3-phosphate|D-erythro-imidazol-glycerol-phosphate|d-erythro-imidazole-glycerol-phosphate"
compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C6H10N2O6P</p></html>
    </notes>
</species>
  <species
    id="M_C04677_c"
    name="1-(5'-Phosphoribosyl)-5-amino-4-imidazolecarboxamide|5'-Phosphoribosyl-5-amino-4-imidazolecarboxamide|5'-Phospho-ribosyl-5-amino-4-imidazolecarboxamide|AICAR|5-Aminoimidazole-4-carboxamide ribotide|5-Phosphoribosyl-4-carbamoyl-5-aminoimidazole|5-Amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide|5-Amino-1-(5-Phospho-D-ribosyl)imidazole-4-carboxamide|5-Amino-1--5-Phospho-D-ribosylimidazole-4-carboxamide|aicar" compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H14N4O8P</p></html>
    </notes>
</species>
  <species
    id="M_C04688_c"
    name="(3R)-3-Hydroxytetradecanoyl-[acyl-carrier protein]|(R)-3-Hydroxytetradecanoyl-[acyl-carrier protein]|beta-Hydroxymyristyl-[acyl-carrier protein]|HMA|R-3-hydroxy-myristoyl-ACP" compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C25H47N2O9PRS</p></html>
    </notes>
</species>
  <species
    id="M_C04691_c"
    name="2-Dehydro-3-deoxy-D-arabino-heptonate 7-phosphate|3-Deoxy-D-arabino-hept-2-ulosonate 7-phosphate|3-Deoxy-arabino-heptulonate 7-phosphate|3-Deoxy-D-arabino-heptulosonic acid 7-phosphate|DAHP|2-Dahp|2-Dehydro-3-deoxy-D-arabino-heptonate 7-phosphate|2-dehydro-3-deoxy-D-arabino-heptonate 7-phosphate|3-deoxy-d-arabino-heptulosonate-7-phosphate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H11O10P</p></html>

```

```

    </notes>
</species>
    <species id="M_C04732_c"
name="4-(1-D-Ribitylamino)-5-amino-2,6-dihydroxypyrimidine|4-(1-D-Ribitylamino)-5-aminour
acil|4--1-D-Ribitylamino-5-aminouracil|4-(1-D-ribitylamino)-5-amino-2,6-dihydroxypyrimidine"
compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H16N4O6</p></html>
    </notes>
</species>
    <species id="M_C04734_c"
name="1-(5'-Phosphoribosyl)-5-formamido-4-imidazolecarboxamide|5'-Phosphoribosyl-5-formam
ido-4-imidazolecarboxamide|5-Formamido-1-(5-phosphoribosyl)imidazole-4-carboxamide|5-For
mamido-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide|5-Formamido-1--5-phospho-D-ribosyl
imidazole-4-carboxamide|5-formamido-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide|FAICA
R" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H14N4O9P</p></html>
    </notes>
</species>
    <species id="M_C04751_c"
name="1-(5-Phospho-D-ribosyl)-5-amino-4-imidazolecarboxylate|1-(5'-Phosphoribosyl)-5-amino-
4-imidazolecarboxylate|1-(5'-Phosphoribosyl)-5-amino-4-carboxyimidazole|5'-Phosphoribosyl-5-a
mino-4-imidazolecarboxylate|1-(5'-Phosphoribosyl)-4-carboxy-5-aminoimidazole|5'-Phosphoribos
yl-4-carboxy-5-aminoimidazole|5-Amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxylate|5-ami
no-1-(5-phospho-D-ribosyl)imidazole-4-carboxylate|5-amino-1--5-phospho-D-ribosylimidazole-4-
carboxylate|1-(5-phosphoribosyl)-5-amino-4-imidazolecarboxylate" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H13N3O9P</p></html>
    </notes>
</species>
    <species id="M_C04752_c" name="2-Methyl-4-amino-5-hydroxymethylpyrimidine
diphosphate|4-Amino-2-methyl-5-diphosphomethylpyrimidine|2-Methyl-4-amino-5-hydroxymeth
ylpyrimidinediphosphate|4-amino-2-methyl-5-diphosphomethylpyrimidine" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C6H9N3O7P2</p></html>
    </notes>
</species>
    <species id="M_C04807_c"
name="2-Amino-7,8-dihydro-4-hydroxy-6-(diphosphooxymethyl)pteridine|2-Amino-4-hydroxy-6
-hydroxymethyl-7,8-dihydropteridine
diphosphate|7,8-Dihydropterin

```

pyrophosphate|2-amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine  
diphosphate|2-Amino-4-hydroxy-6-hydroxymethyl-7-8-dihydropteridinediphosphate|6-hydroxyme  
thyl-dihydropterin pyrophosphate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C7H9N5O8P2</p></html>

</notes>

</species>

<species id="M\_C04823\_c"  
name="1-(5-Phosphoribosyl)-4-(N-succinocarboxamide)-5-aminoimidazole|1-(5-phosphoribosyl)-  
4-(N-succino-carboxamide)-  
5-aminoimidazole|1-(5'-Phosphoribosyl)-5-amino-4-(N-succinocarboxamide)-imidazole|1-(5'-Pho  
sphoribosyl)-4-(N-succinocarboxamide)-5-aminoimidazole|5'-Phosphoribosyl-4-(N-succinocarbox  
amide)-5-aminoimidazole|(S)-2-[5-Amino-1-(5-phospho-D-ribosyl)imidazole-4-  
carboxamido]succinate|SAICAR|(S)-2-[5-Amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxami  
do]succinate|S-2-5-Amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxamido-succinate|5-phosph  
oribosyl-4-(N-succino-carboxamide)-  
5-aminoimidazole|5'-phosphoribosyl-4-(n-succinocarboxamide)-5-aminoimidazole"  
compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C13H16N4O12P</p></html>

</notes>

</species>

<species id="M\_C04874\_c"  
name="2-Amino-4-hydroxy-6-(D-erythro-1,2,3-trihydroxypropyl)-7,8-  
dihydropteridine|Dihydroneopterin|2-Amino-4-hydroxy-6-(D-erythro-1,2,3-trihydroxypropyl)-7,8-  
dihydropteridine|2-amino-4-hydroxy-6-(erythro-1,2,3-trihydroxypropyl)dihydropteridine|dihydro-  
neo-pterin" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H13N5O4</p></html>

</notes>

</species>

<species id="M\_C04877\_c"  
name="UDP-N-acetylmuramoyl-L-alanyl-D-gamma-glutamyl-meso-2,6-  
diaminopimelate|UDP-N-acetylmuramoyl-L-alanyl-D-gamma-glutamyl-meso-2,6-diamino-  
heptanedioate|UDP-N-acetylmuramoyl-L-alanyl-D-gamma-glutamyl-meso-2,6-diaminopimelate|  
UDP-N-acetylmuramoyl-L-alanyl-D-gamma-glutamyl-meso-2-6-diaminopimelate"  
compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C35H51N7O26P2</p></html>

</notes>

</species>



<species id="M\_C04881\_c" name="N-Acetyl-beta-D-mannosaminyl-1,4-N-acetyl-D-glucosaminyl diphosphoundecaprenol" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C71H116N2O17P2</p></html>

</notes>

</species>

<species id="M\_C04882\_c"  
name="UDP-N-acetylmuramoyl-L-alanyl-D-glutamyl-6-carboxy-L-lysyl-D-alanyl-D-alanine|UDP-N-acetylmuramoyl-L-alanyl-D-glutamyl-meso-2,6-diaminopimeloyl-D-alanyl-D-alanine|UDP-N-acetylmuramoyl-L-alanyl-D-glutamyl-meso-2,6-diaminopimeloyl-D-alanyl-D-alanine" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C41H61N9O28P2</p></html>

</notes>

</species>

<species id="M\_C04895\_c"  
name="2-Amino-4-hydroxy-6-(erythro-1,2,3-trihydroxypropyl) dihydropteridine triphosphate|6-(L-erythro-1,2-Dihydroxypropyl 3-triphosphate)-7,8-dihydropterin|6-[(1S,2R)-1,2-Dihydroxy-3-triphosphooxypropyl]-7,8-dihydropterin|2-amino-4-hydroxy-6-(erythro-1,2,3-trihydroxypropyl) dihydropteridine triphosphate|2-Amino-4-hydroxy-6-erythro-1-2-3-trihydroxypropyl dihydropteridine triphosphate|7,8-Dihydropterin 3'-triphosphate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C9H13N5O13P3</p></html>

</notes>

</species>

<species id="M\_C04896\_c"  
name="5-(5-Phospho-D-ribosylaminoformimino)-1-(5-phosphoribosyl)-imidazole-4-carboxamide|N-(5'-Phospho-D-ribosylformimino)-5-amino-1-(5"-phospho-D-ribosyl)-4-imidazolecarboxamide|N-(5'-Phosphoribosylformimino)-5-amino-1-(5"-phosphoribosyl)-4-imidazolecarboxamide|Phosphoribosyl-formimino-AICAR-phosphate|1-(5-Phosphoribosyl)-5-[(5-phosphoribosylamino)methylideneamino]imidazole-4-carboxamide|1-(5-Phosphoribosyl)-5-[(5-phosphoribosylamino)methylideneamino]imidazole-4-carboxamide|phosphoribosylformimino-AICAR-phosphate|phosphoribosylformiminoaicar-phosphate|N-(5'-phospho-D-ribosylformimino)-5-amino-1-(5"-phosphoribosyl)-4-imidazolecarboxamide" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C15H23N5O15P2</p></html>

</notes>

</species>

<species id="M\_C04916\_c" name="N-(5'-Phospho-D-1'-ribulose 5-phosphoribosyl)-5-amino-1-(5"-phospho-D-ribosyl)-4-imidazolecarboxamide 5-[(5-Phospho-1-deoxyribulose 1-ylamino)methylideneamino]-1-(5-phosphoribosyl)imidazole-4-carboxamide [Phosphoribulose 5-phosphoribosyl]-formimino-AICAR-phosphate 5-[(5-phospho-1-deoxyribulose 1-ylamino)methylideneamino]-1-(5-phosphoribosyl)imidazole-4-carboxamide [phosphoribulose 5-phosphoribosyl]-formimino-AICAR-phosphate N-(5'-phospho-D-1'-ribulose 5-phosphoribosyl)-5-amino-1-(5"-phosphoribosyl)-4-imidazolecarboxamide" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>15</sub>H<sub>23</sub>N<sub>5</sub>O<sub>15</sub>P<sub>2</sub></p></html>

</notes>

</species>

<species id="M\_C05042\_c" name="Glufosinate [Phosphinothricin] 2-Amino-4-(hydroxymethylphosphinyl)butanoic acid" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>5</sub>H<sub>12</sub>NO<sub>4</sub>P</p></html>

</notes>

</species>

<species id="M\_C05123\_c" name="2-Hydroxyethanesulfonate 2-Hydroxyethanesulfonic acid 2-Hydroxyethane-1-sulfonic acid [Isethionic acid] [Isethionate]" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>2</sub>H<sub>5</sub>O<sub>4</sub>S</p></html>

</notes>

</species>

<species id="M\_C05123\_e" name="2-Hydroxyethanesulfonate 2-Hydroxyethanesulfonic acid 2-Hydroxyethane-1-sulfonic acid [Isethionic acid] [Isethionate], extracellular" compartment="C\_e">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>2</sub>H<sub>5</sub>O<sub>4</sub>S, extracellular</p></html>

</notes>

</species>

<species id="M\_C05125\_c" name="2-(alpha-Hydroxyethyl)thiamine diphosphate 2-Hydroxyethyl-ThPP" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C<sub>14</sub>H<sub>21</sub>N<sub>4</sub>O<sub>8</sub>P<sub>2</sub>S</p></html>

</notes>

</species>

<species id="M\_C05130\_c" name="Imidazole-4-acetaldehyde [Imidazole acetaldehyde]" compartment="C\_c">

<notes>

```

    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H6N2O</p></html>
  </notes>
</species>
  <species id="M_C05198_c" name="5'-Deoxyadenosine" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H13N5O3</p></html>
      </notes>
    </species>
    <species
      id="M_C05223_c"
      name="Dodecanoyl-[acyl-carrier
protein]|Dodecanoyl-[acp]|Lauroyl-[acyl-carrier
protein]|Dodecanoyl-ACP|Dodecanoyl-ACP
(n-C12:0ACP)|dodecanoyl-acp" compartment="C_c">
      <notes>
        <html
          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C23H43N2O8PRS</p></html>
        </notes>
      </species>
      <species id="M_C05258_c" name="(S)-3-Hydroxyhexadecanoyl-CoA" compartment="C_c">
        <notes>
          <html
            xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C37H63N7O18P3S</p></html>
          </notes>
        </species>
        <species
          id="M_C05259_c"
          name="3-Oxopalmitoyl-CoA|3-Ketopalmitoyl-CoA|3-Oxohexadecanoyl-CoA|3-oxohexadecanoyl
-coa" compartment="C_c">
          <notes>
            <html
              xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C37H61N7O18P3S</p></html>
            </notes>
          </species>
          <species id="M_C05260_c" name="(S)-3-Hydroxytetradecanoyl-CoA" compartment="C_c">
            <notes>
              <html
                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C35H59N7O18P3S</p></html>
              </notes>
            </species>
            <species
              id="M_C05261_c"
              name="3-Oxotetradecanoyl-CoA|3-oxotetradecanoyl-coa"
              compartment="C_c">
              <notes>
                <html
                  xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C35H57N7O18P3S</p></html>
                </notes>
              </species>

```

```

    <species id="M_C05262_c" name="(S)-3-Hydroxydodecanoyl-CoA" compartment="C_c">
      <notes>
        <html
          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C33H55N7O18P3S</p></html>
        </notes>
      </species>
    <species id="M_C05263_c" name="3-Oxododecanoyl-CoA|3-oxododecanoyl-coa"
      compartment="C_c">
      <notes>
        <html
          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C33H53N7O18P3S</p></html>
        </notes>
      </species>
    <species id="M_C05264_c"
      name="(S)-Hydroxydecanoyl-CoA|(S)-3-Hydroxydecanoyl-CoA" compartment="C_c">
      <notes>
        <html
          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C31H51N7O18P3S</p></html>
        </notes>
      </species>
    <species id="M_C05265_c" name="3-Oxodecanoyl-CoA|3-oxodecanoyl-coa"
      compartment="C_c">
      <notes>
        <html
          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C31H49N7O18P3S</p></html>
        </notes>
      </species>
    <species id="M_C05266_c" name="(S)-Hydroxyoctanoyl-CoA|(S)-3-Hydroxyoctanoyl-CoA"
      compartment="C_c">
      <notes>
        <html
          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C29H47N7O18P3S</p></html>
        </notes>
      </species>
    <species id="M_C05267_c" name="3-Oxoctanoyl-CoA|3-oxoocatanoyl-coa"
      compartment="C_c">
      <notes>
        <html
          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C29H45N7O18P3S</p></html>
        </notes>
      </species>
    <species id="M_C05268_c"
      name="(S)-Hydroxyhexanoyl-CoA|(S)-3-Hydroxyhexanoyl-CoA" compartment="C_c">
      <notes>

```

```

        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C27H43N7O18P3S</p></html>
    </notes>
</species>
    <species      id="M_C05269_c"      name="3-Oxohehexanoyl-CoA|3-Ketohexanoyl-CoA"
compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C27H41N7O18P3S</p></html>
    </notes>
</species>
    <species id="M_C05270_c" name="Hexanoyl-CoA|hexanoyl-coa" compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C27H43N7O17P3S</p></html>
    </notes>
</species>
    <species                                           id="M_C05271_c"
name="trans-Hex-2-enoyl-CoA|(2E)-Hexenoyl-CoA|trans-hex-2-enoyl-coa"
compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C27H41N7O17P3S</p></html>
    </notes>
</species>
    <species                                           id="M_C05272_c"
name="trans-Hexadec-2-enoyl-CoA|trans-2-Hexadecenoyl-CoA|(2E)-Hexadecenoyl-CoA|trans-he
xadec-2-enoyl-coa" compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C37H61N7O17P3S</p></html>
    </notes>
</species>
    <species                                           id="M_C05273_c"
name="trans-Tetradec-2-enoyl-CoA|(2E)-Tetradecenoyl-CoA|trans-Tetradec-2-enoyl-CoA
phosphate, n=30)|trans-tetradec-2-enoyl-coa" compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C35H57N7O17P3S</p></html>
    </notes>
</species>
    <species      id="M_C05274_c"      name="Decanoyl-CoA|Decanoyl-CoA
(n-C10:0CoA)|decanoyl-coa" compartment="C_c">
    <notes>

```

```

        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C31H51N7O17P3S</p></html>
    </notes>
</species>
    <species                                id="M_C05275_c"
name="trans-Dec-2-enoyl-CoA|(2E)-Decenoyl-CoA|trans-dec-2-enoyl-coa" compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C31H49N7O17P3S</p></html>
    </notes>
</species>
    <species            id="M_C05276_c"            name="trans-Oct-2-enoyl-CoA|(2E)-Octenoyl-CoA"
compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C29H45N7O17P3S</p></html>
    </notes>
</species>
    <species                                id="M_C05332_c"
name="Phenethylamine|2-Phenylethylamine|beta-Phenylethylamine|Phenylethylamine"
compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H12N</p></html>
    </notes>
</species>
    <species                                id="M_C05332_e"
name="Phenethylamine|2-Phenylethylamine|beta-Phenylethylamine|Phenylethylamine,
extracellular" compartment="C_e">
    <notes>
        <html            xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:            C8H12N,
extracellular</p></html>
    </notes>
</species>
    <species id="M_C05335_c" name="L-Selenomethionine" compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C5H11NO2Se</p></html>
    </notes>
</species>
    <species id="M_C05336_c" name="Selenomethionyl-tRNA(Met)" compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H30N6O11PSeR(C5H8O6PR)n</p></html>
    </notes>

```

```

</species>
  <species id="M_C05345_c" name="D-Fructose 6-phosphate|D-Fructose 6-phosphoric
acid|Neuberg ester|beta-D-Fructose
6-phosphate|D-Fructose6-phosphate|D-fructose-6-phosphate|D-fructose 6-phosphate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O9P</p></html>
  </notes>
</species>
  <species id="M_C05345_e" name="D-Fructose 6-phosphate|D-Fructose 6-phosphoric
acid|Neuberg ester|beta-D-Fructose
6-phosphate|D-Fructose6-phosphate|D-fructose-6-phosphate|D-fructose 6-phosphate,
extracellular" compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O9P,
extracellular</p></html>
  </notes>
</species>
  <species id="M_C05378_c" name="D-Fructose 1,6-bisphosphate|beta-D-Fructose
1,6-bisphosphate|D-fructose-1,6-bisphosphate|D-fructose
1,6-bisphosphate|D-Fructose1-6-bisphosphate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C6H12O12P2</p></html>
  </notes>
</species>
  <species id="M_C05379_c" name="Oxalosuccinate|Oxalosuccinic acid"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H3O7</p></html>
  </notes>
</species>
  <species id="M_C05381_c" name="3-Carboxy-1-hydroxypropyl-ThPP"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C16H22N4O10P2S</p></html>
  </notes>
</species>
  <species id="M_C05382_c" name="Sedoheptulose 7-phosphate|altro-Heptulose
7-phosphate|D-Sedoheptulose 7-phosphate|D-altro-Heptulose
7-phosphate|Sedoheptulose7-phosphate|sedoheptulose 7-phosphate|sedoheptulose-7-phosphate"
compartment="C_c">
  <notes>

```

```

    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H14O10P</p></html>
  </notes>
</species>
  <species id="M_C05385_c" name="D-Glucuronate 1-phosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9O10P</p></html>
    </notes>
  </species>
  <species id="M_C05402_c"
name="Melibiose[6-O-(alpha-D-Galactopyranosyl)-D-glucopyranose|D-Gal-alpha1->6D-Glucose|
D-Gal-alpha-1->6D-Glucose" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C12H22O11</p></html>
    </notes>
  </species>
  <species id="M_C05402_e"
name="Melibiose[6-O-(alpha-D-Galactopyranosyl)-D-glucopyranose|D-Gal-alpha1->6D-Glucose|
D-Gal-alpha-1->6D-Glucose, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C12H22O11,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C05404_c" name="D-Gal alpha 1->6D-Gal alpha
1->6D-Glucose|D-Gal-alpha1->6D-Gal-alpha1->6D-Glucose|Manninotriose"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C18H32O16</p></html>
    </notes>
  </species>
  <species id="M_C05413_c" name="Phytoene" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C40H64</p></html>
    </notes>
  </species>
  <species id="M_C05421_c" name="15-cis-Phytoene" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C40H64</p></html>
    </notes>
  </species>
  <species id="M_C05464_c" name="Glycodeoxycholate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C26H42NO5</p></html>
    </notes>
  </species>

```



```

</species>
  <species id="M_C05466_c" name="Glycochenodeoxycholate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C26H42NO5</p></html>
    </notes>
  </species>
  <species id="M_C05512_c" name="Deoxyinosine|deoxyinosine" compartment="C_c">
    <notes>
      <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H12N4O4</p></html>
    </notes>
  </species>
  <species
                                id="M_C05539_c"
name="N-Acetyl-L-2-amino-6-oxopimelate|L-2-Acetamido-6-oxoheptanedioate|L-2-Acetamido-6
-oxopimelate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H11NO6</p></html>
    </notes>
  </species>
  <species id="M_C05593_c" name="3-Hydroxyphenylacetate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H7O3</p></html>
    </notes>
  </species>
  <species
    id="M_C05649_c"
    name="Dihydropteridine|6,7-Dihydropteridine"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H6N4</p></html>
    </notes>
  </species>
  <species
    id="M_C05650_c"
    name="Tetrahydropteridine|5,6,7,8-Tetrahydropteridine"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H8N4</p></html>
    </notes>
  </species>
  <species
    id="M_C05711_c"
    name="gamma-Glutamyl-beta-cyanoalanine"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H12N3O5</p></html>
    </notes>
  </species>
  <species
    id="M_C05726_c"
    name="S-Substituted
    L-cysteine|R-S-Cysteine"
compartment="C_c">

```

```

    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C3H6NO2SR</p></html>
    </notes>
  </species>
  <species id="M_C05729_c" name="R-S-Cysteinylglycine" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C5H9N2O3SR</p></html>
    </notes>
  </species>
  <species id="M_C05744_c" name="Acetoacetyl-[acp]|Acetoacetyl-[acyl-carrier
protein]|Acetoacetyl-ACP|acetoacetyl-acp" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C15H25N2O9PRS</p></html>
    </notes>
  </species>
  <species id="M_C05745_c" name="Butyryl-[acp]|Butyryl-[acyl-carrier
protein]|Butyryl-ACP" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C15H27N2O8PRS</p></html>
    </notes>
  </species>
  <species id="M_C05746_c" name="3-Oxohexanoyl-[acp]|3-Oxohexanoyl-[acyl-carrier
protein]" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C17H29N2O9PRS</p></html>
    </notes>
  </species>
  <species id="M_C05747_c"
name="(R)-3-Hydroxyhexanoyl-[acp]|(R)-3-Hydroxyhexanoyl-[acyl-carrier
protein]|D-3-Hydroxyhexanoyl-[acp]|D-3-Hydroxyhexanoyl-[acyl-carrier
protein]"
compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C17H31N2O9PRS</p></html>
    </notes>
  </species>
  <species id="M_C05748_c" name="trans-Hex-2-enoyl-[acp]|trans-Hex-2-enoyl-[acyl-carrier
protein]|(2E)-Hexenoyl-[acp]|trans-hex-2-enoyl-acp" compartment="C_c">
    <notes>

```

```

        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C17H29N2O8PRS</p></html>
    </notes>
</species>
    <species          id="M_C05749_c"          name="Hexanoyl-[acp]|Hexanoyl-[acyl-carrier
protein]|Hexanoyl-ACP|hexanoyl-acp" compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C17H31N2O8PRS</p></html>
    </notes>
</species>
    <species          id="M_C05750_c"          name="3-Oxoctanoyl-[acp]|3-Oxoctanoyl-[acyl-carrier
protein]|3-oxooctanoyl-acp" compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C19H33N2O9PRS</p></html>
    </notes>
</species>
    <species          id="M_C05751_c"          name="trans-Oct-2-enoyl-[acp]|trans-Oct-2-enoyl-[acyl-carrier
protein]|2-Octenoyl-[acyl-carrier protein]|(2E)-Octenoyl-[acp]" compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C19H33N2O8PRS</p></html>
    </notes>
</species>
    <species          id="M_C05752_c"          name="Octanoyl-[acp]|Octanoyl-[acyl-carrier
protein]|Octanoyl-ACP|octanoyl-acp" compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C19H35N2O8PRS</p></html>
    </notes>
</species>
    <species          id="M_C05753_c"          name="3-Oxodecanoyl-[acp]|3-Oxodecanoyl-[acyl-carrier
protein]|3-oxodecanoyl-acp" compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C21H37N2O9PRS</p></html>
    </notes>
</species>
    <species          id="M_C05754_c"          name="trans-Dec-2-enoyl-[acp]|trans-Dec-2-enoyl-[acyl-carrier
protein]|(2E)-Decenoyl-[acp]|trans-2-Decenoyl-[acyl-carrier          protein]|trans-dec-2-enoyl-acp"
compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:

```

C21H37N2O8PRS</p></html>  
 </notes>  
 </species>  
 <species id="M\_C05755\_c" name="Decanoyl-[acp]|Decanoyl-[acyl-carrier protein]|Decanoyl-ACP|decanoyl-acp" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C21H39N2O8PRS</p></html>  
 </notes>  
 </species>  
 <species id="M\_C05756\_c" name="3-Oxododecanoyl-[acp]|3-Oxododecanoyl-[acyl-carrier protein]|3-oxododecanoyl-acp" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C23H41N2O9PRS</p></html>  
 </notes>  
 </species>  
 <species id="M\_C05757\_c" name="(R)-3-Hydroxydodecanoyl-[acp]|(R)-3-Hydroxydodecanoyl-[acyl-carrier protein]|D-3-Hydroxydodecanoyl-[acp]|D-3-Hydroxydodecanoyl-[acyl-carrier protein]" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C23H43N2O9PRS</p></html>  
 </notes>  
 </species>  
 <species id="M\_C05758\_c" name="trans-Dodec-2-enoyl-[acp]|trans-Dodec-2-enoyl-[acyl-carrier protein]|(2E)-Dodecenoyl-[acp]|trans-dodec-2-enoyl-acp" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C23H41N2O8PRS</p></html>  
 </notes>  
 </species>  
 <species id="M\_C05759\_c" name="3-Oxotetradecanoyl-[acp]|3-Oxotetradecanoyl-[acyl-carrier protein]|3-oxotetradecanoyl-acp" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C25H45N2O9PRS</p></html>  
 </notes>  
 </species>  
 <species id="M\_C05760\_c" name="trans-Tetradec-2-enoyl-[acp]|trans-Tetradec-2-enoyl-[acyl-carrier

```

protein]](2E)-Tetradecenoyl-[acp]]trans-tetradec-2-enoyl-acp" compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C25H45N2O8PRS</p></html>
    </notes>
  </species>
  <species id="M_C05761_c" name="Tetradecanoyl-[acp]]Tetradecanoyl-[acyl-carrier
protein]]Myristoyl-[acyl-carrier
protein]]myristoyl-[acyl-carrier
protein]]Myristoyl-ACP|Myristoyl-ACP
(n-C14:0ACP)|Myristoyl-ACP-n-C14-0ACP|tetradecanoyl-acp" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C25H47N2O8PRS</p></html>
      </notes>
    </species>
    <species
      id="M_C05762_c"
      name="3-Oxohexadecanoyl-[acp]]3-Oxohexadecanoyl-[acyl-carrier
protein]]3-oxohexadecanoyl-acp" compartment="C_c">
      <notes>
        <html
          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C27H49N2O9PRS</p></html>
        </notes>
      </species>
      <species
        id="M_C05763_c"
        name="trans-Hexadec-2-enoyl-[acp]]trans-Hexadec-2-enoyl-[acyl-carrier
protein]](2E)-Hexadecenoyl-[acp]]trans-hexadec-2-enoyl-acp" compartment="C_c">
        <notes>
          <html
            xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C27H49N2O8PRS</p></html>
          </notes>
        </species>
        <species
          id="M_C05764_c" name="Hexadecanoyl-[acp]]Hexadecanoyl-[acyl-carrier
protein]]hexadecanoyl-[acyl-carrier protein]]hexadecanoyl-acp" compartment="C_c">
          <notes>
            <html
              xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C27H51N2O8PRS</p></html>
            </notes>
          </species>
          <species id="M_C05776_c" name="Vitamin B12|Cobalamin (III)|Cob(III)alamin"
compartment="C_c">
            <notes>
              <html
                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C61H86CoN13O14PR</p></html>
              </notes>
            </species>

```

```

</species>
  <species id="M_C05776_e" name="Vitamin B12|Cobalamin (III)|Cob(III)alamin,
extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C61H86CoN13O14PR,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C05778_c" name="Sirohydrochlorin|sirohydrochlorin" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C42H38N4O16</p></html>
    </notes>
  </species>
  <species id="M_C05809_c"
name="3-Octaprenyl-4-hydroxybenzoate|3-octaprenyl-4-hydroxybenzoate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C47H69O3</p></html>
    </notes>
  </species>
  <species id="M_C05810_c"
name="2-Octaprenylphenol|2-octaprenylphenol" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C46H70O</p></html>
    </notes>
  </species>
  <species id="M_C05817_c"
name="2-Succinyl-6-hydroxy-2,4-cyclohexadiene-1-carboxylate|(1S,6R)-6-Hydroxy-2-succinylcy
clohexa-2,4-diene-1-carboxylate|2-succinyl-6-hydroxy-2,4-cyclohexadiene-1-carboxylate|2-Succi
nyl-6-hydroxy-2,4-cyclohexadiene-1-carboxylate|(1R,6R)-6-Hydroxy-2-succinylcyclohexa-2,4-di
ene-1-carboxylate|(1R,6R)-2-Succinyl-6-hydroxy-2,4-cyclohexadiene-1-carboxylate|SHCHC"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C11H10O6</p></html>
    </notes>
  </species>
  <species id="M_C05818_c"
name="2-dmmq7|2-Demethylmenaquinone 7|2-demethyl
menaquinone|2-Demethylmenaquinone" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C45H62O2</p></html>
    </notes>
  </species>
  <species id="M_C05820_c" name="(L-Seryl)adenylate" compartment="C_c">
    <notes>

```

```

        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C13H19N6O9P</p></html>
    </notes>
</species>
    <species      id="M_C05822_c"      name="3'-CMP|Cytidine      3'-phosphate|3'-cmp"
compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H13N3O8P</p></html>
    </notes>
</species>
    <species id="M_C05822_e" name="3'-CMP|Cytidine 3'-phosphate|3'-cmp, extracellular"
compartment="C_e">
    <notes>
        <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C9H13N3O8P,
extracellular</p></html>
    </notes>
</species>
    <species id="M_C05840_c" name="Iminoaspartate|iminoaspartate" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H3NO4</p></html>
    </notes>
</species>
    <species id="M_C05841_c" name="Nicotinate D-ribonucleoside" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C11H13NO6</p></html>
    </notes>
</species>
    <species id="M_C05887_c" name="N-Acetyl-D-muramoate" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C11H18NO8</p></html>
    </notes>
</species>
    <species
                                                                    id="M_C05897_c"
name="Undecaprenyl-diphospho-N-acetylmuramoyl-L-alanyl-D-glutamyl-meso-
2,6-diaminopimeloyl-D-alanyl-D-alanine|Undecaprenyl-diphospho-N-acetylmuramoyl-L-alanyl-D
-glutamyl-meso-2,6-diaminopimeloyl-D-alanyl-D-alanine|Undecaprenyl-diphospho-N-acetylmura
moyl-L-alanyl-D-glutamyl-meso-2-6-diaminopimeloyl-D-alanyl-D-alanine"
compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C87H139N7O23P2</p></html>
    </notes>
</species>

```

```

    <species id="M_C05898_c"
name="Undecaprenyl-diphospho-N-acetylmuramoyl-(N-acetylglucosamine)-L-
alanyl-D-glutamyl-meso-2,6-diaminopimeloyl-D-alanyl-D-alanine|Undecaprenyl-diphospho-N-ac
etylmuramoyl-(N-acetylglucosamine)-L-ala-D-glu-meso-2,6-diaminopimeloyl-D-ala-D-ala|Undec
aprenyl-diphospho-N-acetylmuramoyl-(N-acetylglucosamine)-L-alanyl-D-glutamyl-meso-2,6-dia
minopimeloyl-D-alanyl-D-alanine|Undecaprenyl-diphospho-N-acetylmuramoyl--N-acetylglucosa
mine-L-ala-D-glu-meso-2-6-diaminopimeloyl-D-ala-D-ala" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C95H152N8O28P2</p></html>
    </notes>
</species>
    <species id="M_C05922_c" name="Formamidopyrimidine nucleoside triphosphate"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H18N5O15P3</p></html>
    </notes>
</species>
    <species id="M_C05923_c" name="2,5-Diaminopyrimidine nucleoside triphosphate"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H18N5O14P3</p></html>
    </notes>
</species>
    <species id="M_C05928_c" name="10-Formyltetrahydrofolyl
L-glutamate|10-Formyl-THF-L-glutamate" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C25H27N8O10</p></html>
    </notes>
</species>
    <species id="M_C05938_c" name="L-4-Hydroxyglutamate
semialdehyde|L-4-Hydroxyglutamatesemialdehyde" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H9NO4</p></html>
    </notes>
</species>
    <species id="M_C05945_c" name="L-Arginine
phosphate|N5-[Imino(phosphonoamino)methyl]L-ornithine|omega-N-Phosphoarginine|Arginine
phosphate|L-Arginine-NG-phosphoric acid|Phosphoarginine
A|N-Phospho-L-arginine|N(omega)-Phospho-L-arginine|Phosphoarginine" compartment="C_c">
    <notes>

```



```

    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C6H14N4O5P</p></html>
  </notes>
</species>
  <species                                id="M_C05945_e"                                name="L-Arginine
phosphate|N5-[Imino(phosphonoamino)methyl]L-ornithine|omega-N-Phosphoarginine|Arginine
phosphate|L-Arginine-NG-phosphoric                                acid|Phosphoarginine
A|N-Phospho-L-arginine|N(omega)-Phospho-L-arginine|Phosphoarginine,                                extracellular"
compartment="C_e">
    <notes>
      <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C6H14N4O5P,
extracellular</p></html>
    </notes>
</species>
  <species  id="M_C05946_c"  name="4-Hydroxy-2-oxoglutarate|4-Hydroxy-2-oxoglutaric
acid|D-4-Hydroxy-2-oxoglutarate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H4O6</p></html>
    </notes>
</species>
  <species  id="M_C05947_c"  name="4-Hydroxy-L-glutamate|4-Hydroxy-L-glutamic
acid|L-erythro-4-Hydroxyglutamate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H8NO5</p></html>
    </notes>
</species>
  <species id="M_C05951_c" name="Leukotriene D4|LTD4" compartment="C_c">
    <notes>
      <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C25H39N2O6S</p></html>
    </notes>
</species>
  <species id="M_C06000_c" name="(S)-3-Hydroxyisobutyryl-CoA" compartment="C_c">
    <notes>
      <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C25H39N7O18P3S</p></html>
    </notes>
</species>
  <species                                id="M_C06001_c"
name="3-Hydroxy-2-methylpropanoate|3-Hydroxyisobutyrate|3-Hydroxyisobutyric
acid|(S)-3-Hydroxyisobutyrate|3-hydroxy-isobutyrate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H7O3</p></html>
    </notes>

```

```

</species>
  <species id="M_C06002_c"
name="2-Methyl-3-oxopropanoate|3-Oxo-2-methylpropanoate|(S)-Methylmalonate
semialdehyde|Methylmalonate semialdehyde|methylmalonate-semialdehyde"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H5O3</p></html>
  </notes>
</species>
  <species id="M_C06006_c"
name="(S)-2-Aceto-2-hydroxybutanoate|(S)-2-Hydroxy-2-ethyl-3-oxobutanoate|S-2-Aceto-2-hydr
oxybutanoate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9O4</p></html>
  </notes>
</species>
  <species id="M_C06007_c"
name="2,3-Dihydroxy-3-methylpentanoate|2,3-Dihydroxy-3-methylvalerate|2,3-dihydroxy-3-met
hylvalerate|2,3-dihydroxy-3-methylpentanoate|(R)-2,3-Dihydroxy-3-methylpentanoate|(R)-2,3-Di
hydroxy-3-methylvalerate|(2R,3R)-2,3-Dihydroxy-3-methylpentanoate|R-2,3-Dihydroxy-3-methy
lpentanoate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H11O4</p></html>
  </notes>
</species>
  <species id="M_C06008_c" name="(3R)-3-Methyl-2-oxopentanoic
acid|(R)-2-Oxo-3-methylpentanoic acid|(R)-2-Oxo-3-methylpentanoate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9O3</p></html>
  </notes>
</species>
  <species id="M_C06019_c" name="D-arabino-3-Hexulose
6-phosphate|D-arabino-6-Phospho-hex-3-ulose" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O9P</p></html>
  </notes>
</species>
  <species id="M_C06054_c"
name="2-Oxo-3-hydroxy-4-phosphobutanoate|alpha-Keto-3-hydroxy-4-phosphobutyrate|(3R)-3-H
ydroxy-2-oxo-4-phosphonooxybutanoate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H5O8P</p></html>
  </notes>
</species>

```

```

    <species id="M_C06055_c"
name="O-Phospho-4-hydroxy-L-threonine|4-(Phosphonooxy)-threonine|4-(Phosphonooxy)-L-thre
online" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H9NO7P</p></html>
    </notes>
</species>
    <species id="M_C06112_c"
name="L-Glutamyl-tRNA(Gln)|Glu-tRNA(Gln)|Glutamyl-tRNA(Gln)" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H28N6O13PR(C5H8O6PR)n</p></html>
    </notes>
</species>
    <species id="M_C06113_c"
name="L-Aspartyl-tRNA(Asn)|Asp-tRNA(Asn)|Aspartyl-tRNA(Asn)" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C14H22NO13PR2(C5H8O6PR)n</p></html>
    </notes>
</species>
    <species id="M_C06114_c"
name="gamma-Glutamyl-beta-aminopropiononitrile|gamma-Glutamyl-3-aminopropiononitrile"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H13N3O3</p></html>
    </notes>
</species>
    <species id="M_C06135_c"
name="GA2|GalNAc-beta1->4Gal-beta1->4Glc-beta1->1'Cer|GalNAc-beta1->4LacCer"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C39H69N2O18R</p></html>
    </notes>
</species>
    <species id="M_C06142_c" name="1-Butanol|n-Butanol" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H10O</p></html>
    </notes>
</species>
    <species id="M_C06148_c"
name="2,5-Diamino-6-(5'-triphosphoryl-3',4'-trihydroxy-2'-oxopentyl)-amino-4-oxopyrimidine"
compartment="C_c">

```

```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H18N5O14P3</p></html>
    </notes>
  </species>
  <species id="M_C06156_c" name="alpha-D-Glucosamine 1-phosphate|D-Glucosamine
1-phosphate|D-Glucosamine1-phosphate|D-glucosamine 1-phosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H14NO8P</p></html>
    </notes>
  </species>
  <species id="M_C06186_c"
name="Arbutin|Ursin|Uvasol|Hydroquinone-O-beta-D-glucopyranoside|arbutin"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C12H16O7</p></html>
    </notes>
  </species>
  <species id="M_C06186_e"
name="Arbutin|Ursin|Uvasol|Hydroquinone-O-beta-D-glucopyranoside|arbutin, extracellular"
compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C12H16O7,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C06187_c" name="Arbutin 6-phosphate|Arbutin-6P|arbutin 6-phosphate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C12H16O10P</p></html>
    </notes>
  </species>
  <species id="M_C06188_c" name="Salicin 6-phosphate|Salicin-6P|salicin 6-phosphate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C13H18O10P</p></html>
    </notes>
  </species>
  <species id="M_C06193_c" name="Guanosine 3'-phosphate|3'-GMP|3'-Guanylic
acid|Guo-3'-P|Gp" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:

```

C10H13N5O8P</p></html>  
 </notes>  
 </species>  
 <species id="M\_C06193\_e" name="Guanosine 3'-phosphate|3'-GMP|3'-Guanylic acid|Guo-3'-P|Gp, extracellular" compartment="C\_e">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H13N5O8P, extracellular</p></html>  
 </notes>  
 </species>  
 <species id="M\_C06194\_c" name="2',3'-Cyclic GMP" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H11N5O7P</p></html>  
 </notes>  
 </species>  
 <species id="M\_C06205\_c" name="1,2-Dihydronaphthalene-1,2-diol" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H10O2</p></html>  
 </notes>  
 </species>  
 <species id="M\_C06228\_c" name="Ferrichrome" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C27H45FeN9O12</p></html>  
 </notes>  
 </species>  
 <species id="M\_C06228\_e" name="Ferrichrome, extracellular" compartment="C\_e">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C27H45FeN9O12, extracellular</p></html>  
 </notes>  
 </species>  
 <species id="M\_C06231\_c" name="Ectoine|L-Ectoine|ectoine" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H10N2O2</p></html>  
 </notes>  
 </species>  
 <species id="M\_C06231\_e" name="Ectoine|L-Ectoine|ectoine, extracellular" compartment="C\_e">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H10N2O2, extracellular</p></html>  
 </notes>

```

</species>
  <species id="M_C06232_c" name="Molybdate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: H2MoO4</p></html>
    </notes>
  </species>
  <species id="M_C06232_e" name="Molybdate, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: H2MoO4,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C06244_c" name="Acetamide|acetamide" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H5NO</p></html>
    </notes>
  </species>
  <species id="M_C06250_c" name="Holo-[carboxylase]|Biotin-carboxyl-carrier protein"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C17H27N5O4R2S</p></html>
    </notes>
  </species>
  <species id="M_C06311_c" name="Galactitol 1-phosphate|D-Galactitol
1-phosphate|L-Galactitol 6-phosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H14O9P</p></html>
    </notes>
  </species>
  <species id="M_C06369_c" name="2-Deoxy-D-glucose 6-phosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O8P</p></html>
    </notes>
  </species>
  <species id="M_C06369_e" name="2-Deoxy-D-glucose 6-phosphate, extracellular"
compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O8P,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C06424_c" name="Tetradecanoic acid|Tetradecanoate|Myristic
acid|tetradecanoate (C14:0)|tetradecanoate|tetradecanoate (n-C14:0)" compartment="C_c">

```

```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C14H27O2</p></html>
    </notes>
  </species>
  <species id="M_C06441_c" name="L-Xylulose 1-phosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O8P</p></html>
    </notes>
  </species>
  <species id="M_C06468_c"
name="D-Psicose|D-ribo-2-Hexulose|D-ribo-2-Ketohexulose|D-erythro-Hexulose|D-Pseudofructo
se|D-Allulose|D-Altrulose" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O6</p></html>
    </notes>
  </species>
  <species id="M_C06468_e"
name="D-Psicose|D-ribo-2-Hexulose|D-ribo-2-Ketohexulose|D-erythro-Hexulose|D-Pseudofructo
se|D-Allulose|D-Altrulose, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O6,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C06481_c" name="L-Seryl-tRNA(Sec)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C13H22NO12PR2(C5H8O6PR)n</p></html>
    </notes>
  </species>
  <species id="M_C06567_c" name="Penicilloic acid" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C9H11N2O5RS</p></html>
    </notes>
  </species>
  <species id="M_C06696_c" name="Lead|Pb|Pb2+" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Pb</p></html>
    </notes>
  </species>
  <species id="M_C06696_e" name="Lead|Pb|Pb2+, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Pb,

```

```

extracellular</p></html>
    </notes>
</species>
    <species id="M_C06697_c" name="Arsenite|arsenite" compartment="C_c">
        <notes>
            <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: H3O3As</p></html>
        </notes>
    </species>
    <species id="M_C06697_e" name="Arsenite|arsenite, extracellular" compartment="C_e">
        <notes>
            <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: H3O3As,
extracellular</p></html>
        </notes>
    </species>
    <species id="M_C06730_c"
name="4-Methylcatechol|3,4-Dihydroxytoluene|1,2-Dihydroxy-4-methylbenzene|4-Methyl-1,2-be
nzenediol" compartment="C_c">
        <notes>
            <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H8O2</p></html>
        </notes>
    </species>
    <species id="M_C06735_c" name="Aminoacetaldehyde|aminoacetaldehyde"
compartment="C_c">
        <notes>
            <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H6NO</p></html>
        </notes>
    </species>
    <species id="M_C06755_c" name="Chloroacetic acid|Chloroethanoic acid"
compartment="C_c">
        <notes>
            <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H2O2Cl</p></html>
        </notes>
    </species>
    <species id="M_C06892_c" name="2-Deoxy-5-keto-D-gluconic
acid|DKH|2-deoxy-5-keto-D-gluconic-acid" compartment="C_c">
        <notes>
            <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9O6</p></html>
        </notes>
    </species>
    <species id="M_C06892_e" name="2-Deoxy-5-keto-D-gluconic
acid|DKH|2-deoxy-5-keto-D-gluconic-acid, extracellular" compartment="C_e">
        <notes>
            <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9O6,
extracellular</p></html>

```



```

    </notes>
</species>
    <species                                     id="M_C06893_c"
name="6-Phospho-5-dehydro-2-deoxy-D-gluconate|5-Dehydro-2-deoxy-D-gluconate
6-phosphate|2-Deoxy-5-keto-D-gluconic                                     acid
6-phosphate|DKHP|2-deoxy-5-keto-D-gluconic-acid-6-phosphate" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9O9P</p></html>
    </notes>
</species>
    <species id="M_C07086_c" name="Phenyl acetate|Acetylphenol|Acetic acid,phenyl
ester|Phenylacetic acid|Benzylformic acid|Phenylacetate|Benzeneacetic
acid|Benzylformate|Phenylaceticacid|phenylacetate|PACT" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H8O2</p></html>
    </notes>
</species>
    <species                                     id="M_C07335_c"
name="2-Amino-3-oxo-4-phosphonooxybutyrate|L-2-Amino-3-oxo-4-phosphonooxybutyrate|(2S)
-2-Amino-3-oxo-4-phosphonooxybutanoate" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H7NO7P</p></html>
    </notes>
</species>
    <species id="M_C07478_c" name="2-Hydroxy-5-methyl-cis,cis-muconate"
compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H6O5</p></html>
    </notes>
</species>
    <species                                     id="M_C07479_c"
name="2-Oxo-5-methyl-cis-muconate|2-oxo-5-methyl-cis-muconate" compartment="C_c">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H6O5</p></html>
    </notes>
</species>
    <species id="M_C07597_c" name="Ferroxamine|Ferrioxamine|ferrooxamine"
compartment="C_c">
    <notes>
        <html                                     xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C25H46FeN6O8</p></html>
    </notes>
</species>
    <species id="M_C07597_e" name="Ferroxamine|Ferrioxamine|ferrooxamine, extracellular"

```

```

compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C25H46FeN6O8,
extracellular</p></html>
  </notes>
</species>
<species id="M_C08240_c" name="Gentiobiose" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C12H22O11</p></html>
  </notes>
</species>
<species id="M_C08240_e" name="Gentiobiose, extracellular" compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C12H22O11,
extracellular</p></html>
  </notes>
</species>
<species id="M_C08275_c" name="L-Djenkolic acid|Djenkolic acid|Djenkolate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C7H14N2O4S2</p></html>
  </notes>
</species>
<species id="M_C08275_e" name="L-Djenkolic acid|Djenkolic acid|Djenkolate,
extracellular" compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H14N2O4S2,
extracellular</p></html>
  </notes>
</species>
<species id="M_C08276_c" name="3-(Methylthio)propionic
acid|3-Methylthiopropionate|3-methylthiopropionate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H7O2S</p></html>
  </notes>
</species>
<species id="M_C08325_c" name="Amygdalin" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H27NO11</p></html>
  </notes>
</species>
<species id="M_C08325_e" name="Amygdalin, extracellular" compartment="C_e">

```

```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C20H27NO11,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C09332_c" name="Tetrahydrofolyl-[Glu](2)|THF-L-glutamate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C24H27N8O9</p></html>
    </notes>
  </species>
  <species id="M_C09815_c" name="Benzamide" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H7NO</p></html>
    </notes>
  </species>
  <species id="M_C10172_c" name="Stachydrine|proline betaine" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H13NO2</p></html>
    </notes>
  </species>
  <species id="M_C10172_e" name="Stachydrine|proline betaine, extracellular"
compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H13NO2,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C11145_c" name="Methanesulfonic
acid|methanesulfonate|Methanesulfonate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: CH3O3S</p></html>
    </notes>
  </species>
  <species id="M_C11145_e" name="Methanesulfonic acid|methanesulfonate|Methanesulfonate,
extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: CH3O3S,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C11355_c"
name="4-Amino-4-deoxychorismate|ADC|4-amino-4-deoxychorismate" compartment="C_c">

```

```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H10NO5</p></html>
    </notes>
  </species>
  <species id="M_C11356_c" name="trans,trans,cis-Geranylgeranyl
diphosphate|trans,trans,cis-Geranylgeranyl pyrophosphate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H34O7P2</p></html>
    </notes>
  </species>
  <species id="M_C11434_c" name="2-C-Methyl-D-erythritol
4-phosphate|2-C-methyl-D-erythritol
4-phosphate|2-C-methyl-D-erythritol4-phosphate|2-c-methyl-d-erythritol-4-phosphate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H12O7P</p></html>
    </notes>
  </species>
  <species id="M_C11435_c" name="4-(Cytidine
5'-diphospho)-2-C-methyl-D-erythritol|4-(cytidine
5'-diphospho)-2-C-methyl-D-erythritol|4--cytidine5-diphospho-2-C-methyl-D-erythritol"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C14H23N3O14P2</p></html>
    </notes>
  </species>
  <species id="M_C11436_c" name="2-Phospho-4-(cytidine
5'-diphospho)-2-C-methyl-D-erythritol|2-phospho-4-(cytidine
5'-diphospho)-2-C-methyl-D-erythritol|2-phospho-4--cytidine5-diphospho-2-C-methyl-D-erythrito
l" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C14H23N3O17P3</p></html>
    </notes>
  </species>
  <species id="M_C11437_c" name="1-Deoxy-D-xylulose 5-phosphate|1-deoxy-D-xylulose
5-phosphate|1-deoxy-D-xylulose5-phosphate|1-deoxy-d-xylulose 5-phosphate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O7P</p></html>
    </notes>
  </species>

```

```

    <species          id="M_C11453_c"          name="2-C-Methyl-D-erythritol
2,4-cyclodiphosphate|3-Methyl-1,2,3,4-tetrahydroxybutane-1,3-cyclic
bispophosphate|2-C-methyl-D-erythritol
2,4-cyclodiphosphate|2-C-methyl-D-erythritol2-4-cyclodiphosphate|2-c-methyl-d-erythritol-2,4-cy
clodiphosphate" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O9P2</p></html>
    </notes>
</species>
    <species id="M_C11458_c" name="Crotono-betaine|crotonobetaine" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H16NO</p></html>
    </notes>
</species>
    <species id="M_C11458_e" name="Crotono-betaine|crotonobetaine, extracellular"
compartment="C_e">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H16NO,
extracellular</p></html>
    </notes>
</species>
    <species id="M_C11459_c" name="Butyro-betaine" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H18NO</p></html>
    </notes>
</species>
    <species id="M_C11459_e" name="Butyro-betaine, extracellular" compartment="C_e">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H18NO,
extracellular</p></html>
    </notes>
</species>
    <species id="M_C11481_c" name="Sulfite|Hydrogen sulfite|HSO3-|Sulfite
(HSO3)-|Bisulfite|sulfite|H2SO3" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: HO3S</p></html>
    </notes>
</species>
    <species id="M_C11536_c" name="(2R)-O-Phospho-3-sulfolactate|(2R)-Phosphosulfolactate"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H4O9PS</p></html>
    </notes>
</species>

```

```

<species id="M_C11537_c" name="(2R)-3-Sulfolactate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H4O6S</p></html>
  </notes>
</species>
<species id="M_C11546_c" name="2-(beta-D-Glucosyl)-sn-glycerol" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H18O8</p></html>
  </notes>
</species>
<species id="M_C11546_e" name="2-(beta-D-Glucosyl)-sn-glycerol, extracellular"
compartment="C_e">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H18O8,
extracellular</p></html>
  </notes>
</species>
<species id="M_C11638_c" name="3-Amino-2-oxopropyl
phosphate|1-Amino-3-(phosphohydroxy)propan-2-one" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C3H8NO5P</p></html>
  </notes>
</species>
<species id="M_C11811_c" name="1-Hydroxy-2-methyl-2-butenyl
4-diphosphate|(E)-4-Hydroxy-3-methylbut-2-en-1-yl
diphosphate|1-hydroxy-2-methyl-2-(E)-butenyl 4-diphosphate|1-hydroxy-2-methyl-2--butenyl
4-diphosphate|1-hydroxy-2-methyl-2--E-butenyl|4-diphosphate|1-hydroxy-2-methyl-2-(e)-butenyl
4-diphosphate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10O8P2</p></html>
  </notes>
</species>
<species id="M_C11821_c" name="5-Hydroxyisourate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H4N4O4</p></html>
  </notes>
</species>
<species id="M_C11838_c" name="(S)-4,5-dihydroxypentan-2,3-dione"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H8O4</p></html>
  </notes>
</species>
<species id="M_C11907_c"

```

name="dTDP-4-dehydro-6-deoxy-alpha-D-glucose|dTDP-4-oxo-6-deoxy-alpha-D-glucose|4,6-Di deoxy-4-oxo-dTDP-D-glucose|dTDP-4-oxo-6-deoxy-D-glucose|dTDP-4-dehydro-6-deoxy-D-glucose|dTDP-4-dehydro-6-deoxy-alpha-D-galactose|dTDP-4-dehydro-6-deoxy-D-galactose|dtdp-4-dehydro-6-deoxy-d-glucose" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C16H22N2O15P2</p></html>

</notes>

</species>

<species id="M\_C12147\_c" name="L-Threonine O-3-phosphate|L-Threonine phosphate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H9NO6P</p></html>

</notes>

</species>

<species id="M\_C12147\_e" name="L-Threonine O-3-phosphate|L-Threonine phosphate, extracellular" compartment="C\_e">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H9NO6P, extracellular</p></html>

</notes>

</species>

<species id="M\_C12248\_c" name="5-Hydroxy-2-oxo-4-ureido-2,5-dihydro-1H-imidazole-5-carboxylate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H5N4O5</p></html>

</notes>

</species>

<species id="M\_C14088\_c" name="3-Methylsalicylate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H7O3</p></html>

</notes>

</species>

<species id="M\_C14098\_c" name="2-Methylnaphthalene|beta-Methylnaphthalene" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C11H10</p></html>

</notes>

</species>

<species id="M\_C14103\_c" name="4-Methylsalicylate|m-Cresotic acid|2-Hydroxy-4-methylbenzoic acid" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H7O3</p></html>

```

    </notes>
</species>
    <species id="M_C14109_c"
name="4-Hydroxymethylsalicylate|2-Hydroxy-4-hydroxymethylbenzoic acid"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H7O4</p></html>
    </notes>
</species>
    <species id="M_C14110_c" name="4-Hydroxymethylcatechol" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H8O3</p></html>
    </notes>
</species>
    <species id="M_C14115_c" name="Naphthyl-2-methyl-succinic acid" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C15H12O4</p></html>
    </notes>
</species>
    <species id="M_C14145_c" name="(3S)-3-Hydroxyadipyl-CoA" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C27H40N7O20P3S</p></html>
    </notes>
</species>
    <species id="M_C14179_c" name="Sulfoacetate|Sulfoacetic acid|sulfoacetate"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H2O5S</p></html>
    </notes>
</species>
    <species id="M_C14179_e" name="Sulfoacetate|Sulfoacetic acid|sulfoacetate, extracellular"
compartment="C_e">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H2O5S,
extracellular</p></html>
    </notes>
</species>
    <species id="M_C14463_c" name="(R)-3-Hydroxy-3-methyl-2-oxopentanoate"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9O4</p></html>
    </notes>
</species>

```



```

    <species id="M_C14786_c" name="(1R,2S)-Naphthalene 1,2-oxide|(1R,2S)-Naphthalene
epoxide" compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H8O</p></html>
      </notes>
    </species>
    <species id="M_C14787_c" name="(1S,2R)-Naphthalene 1,2-oxide|(1S,2R)-Naphthalene
epoxide" compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H8O</p></html>
      </notes>
    </species>
    <species id="M_C14800_c" name="1-Nitronaphthalene-5,6-oxide" compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H7NO3</p></html>
      </notes>
    </species>
    <species
      id="M_C14801_c"
      name="1-Nitro-5,6-dihydroxy-dihydronaphthalene|1,2-Dihydro-5-nitro-1,2-naphthalenediol"
      compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C10H9NO4</p></html>
      </notes>
    </species>
    <species id="M_C14818_c" name="Fe2+|Fe(II)|Ferrous ion|Iron(2+)" compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Fe</p></html>
      </notes>
    </species>
    <species id="M_C14818_e" name="Fe2+|Fe(II)|Ferrous ion|Iron(2+), extracellular"
      compartment="C_e">
      <notes>
        <html
          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Fe,
extracellular</p></html>
      </notes>
    </species>
    <species id="M_C14819_c" name="Fe3+|Fe(III)|Ferric ion|Iron(3+)|fe3"
      compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Fe</p></html>
      </notes>
    </species>
    <species id="M_C14819_e" name="Fe3+|Fe(III)|Ferric ion|Iron(3+)|fe3, extracellular"
      compartment="C_e">

```

```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Fe,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_C14850_c" name="Benzo[a]pyrene-7,8-oxide|Benzo[a]pyrene-7,8-epoxide"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C20H12O</p></html>
    </notes>
  </species>
  <species id="M_C14852_c"
name="Benzo[a]pyrene-7,8-diol|Benzo[a]pyrene-7,8-dihydrodiol" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C20H14O2</p></html>
    </notes>
  </species>
  <species id="M_C15547_c" name="1,4-Dihydroxy-2-naphthoyl-CoA" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C32H39N7O19P3S</p></html>
    </notes>
  </species>
  <species id="M_C15556_c" name="3,4-Dihydroxy-2-butanone
4-phosphate|3,4-dihydroxy-2-butanone 4-phosphate|3-4-dihydroxy-2-butanone4-phosphate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H8O6P</p></html>
    </notes>
  </species>
  <species id="M_C15586_c" name="Nebularine|Purine riboside|N-D-Ribosylpurine|Purine
nucleoside" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C10H12N4O4</p></html>
    </notes>
  </species>
  <species id="M_C15587_c" name="Purine|purine" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H4N4</p></html>
    </notes>
  </species>
  <species id="M_C15606_c"
name="1,2-Dihydroxy-5-(methylthio)pent-1-en-3-one|1,2-dihydroxy-3-keto-5-methylthiopentene"

```

```

compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9O3S</p></html>
  </notes>
</species>
  <species id="M_C15650_c"
name="2,3-Diketo-5-methylthiopentyl-1-phosphate|5-(Methylthio)-2,3-dioxopentyl
phosphate|2,3-diketo-5-methylthio-1-phosphopentane|2,3-diketo5-methylthio-1-phosphopentane|2
,3-diketo-5-methylthiopentyl-1-phosphate|2-3-diketo-5-methylthio-1-phosphopentane"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H10O6PS</p></html>
  </notes>
</species>
  <species id="M_C15651_c"
name="2-Hydroxy-3-keto-5-methylthiopentenyl-1-phosphate|2-Hydroxy-5-(methylthio)-3-oxopen
t-1-enyl phosphate|2-hydroxy-3-keto-5-methylthiopentenyl-1-phosphate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9O6PS</p></html>
  </notes>
</species>
  <species id="M_C15670_c" name="Heme A|hemeA" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C49H54FeN4O6</p></html>
  </notes>
</species>
  <species id="M_C15672_c" name="Heme O|hemeO|heme o" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C49H56FeN4O5</p></html>
  </notes>
</species>
  <species id="M_C15811_c" name="[Enzyme]-cysteine|Thiamine biosynthesis intermediate 2"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C4H6N2O2SR2</p></html>
  </notes>
</species>
  <species id="M_C15812_c" name="[Enzyme]-S-sulfanlycysteine|Thiamine biosynthesis
intermediate 3" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:

```

C4H6N2O2S2R2</p></html>  
 </notes>  
 </species>  
 <species id="M\_C15817\_c" name="Heme C" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C40H44FeN6O8S2</p></html>  
 </notes>  
 </species>  
 <species id="M\_C15972\_c" name="Lipoamide|Thioctic acid  
 amide|lipoamide|Lipoamide-E|Enzyme N6-(lipoyl)lysine" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H15NOS2</p></html>  
 </notes>  
 </species>  
 <species id="M\_C15973\_c"  
 name="Dihydrolipoamide|Dihydrothioctamide|dihydrolipoamide|Dihydrolipoamide-E|Enzyme  
 N6-(dihydrolipoyl)lysine" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H17NOS2</p></html>  
 </notes>  
 </species>  
 <species id="M\_C15974\_c"  
 name="3-Methyl-1-hydroxybutyl-ThPP|3-Methyl-1-hydroxybutyl-TPP" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C17H27N4O8P2S</p></html>  
 </notes>  
 </species>  
 <species id="M\_C15975\_c" name="[Dihydrolipoyllysine-residue  
 (2-methylpropanoyl)transferase]  
 S-(3-methylbutanoyl)dihydrolipoyllysine|S-(3-Methylbutanoyl)-dihydrolipoamide-E"  
 compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C13H25NO2S2</p></html>  
 </notes>  
 </species>  
 <species id="M\_C15976\_c"  
 name="2-Methyl-1-hydroxypropyl-ThPP|2-Methyl-1-hydroxypropyl-TPP" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C16H25N4O8P2S</p></html>  
 </notes>

```

</species>
  <species id="M_C15977_c"
name="S-(2-Methylpropanoyl)-dihydrolipoamide|S-(2-Methylpropionyl)-dihydrolipoamide|[Dihy
drolipoyllysine-residue (2-methylpropanoyl)transferase]
S-(2-methylpropanoyl)dihydrolipoyllysine|S-(2-Methylpropanoyl)-dihydrolipoamide-E|S-(2-Meth
ylpropionyl)-dihydrolipoamide-E|Enzyme N6-(S-[2-methylpropanoyl]dihydrolipoyl)lysine"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C12H23NO2S2</p></html>
  </notes>
</species>
  <species id="M_C15978_c"
name="2-Methyl-1-hydroxybutyl-ThPP|2-Methyl-1-hydroxybutyl-TPP" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C17H27N4O8P2S</p></html>
  </notes>
</species>
  <species id="M_C15979_c" name="[Dihydrolipoyllysine-residue
(2-methylpropanoyl)transferase]
S-(2-methylbutanoyl)dihydrolipoyllysine|S-(2-Methylbutanoyl)-dihydrolipoamide-E"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C13H25NO2S2</p></html>
  </notes>
</species>
  <species id="M_C15980_c"
name="2-Methylbutanoyl-CoA|2-Methylbutyryl-CoA|2-methylbutyryl-CoA|(S)-2-Methylbutanoyl
-CoA|M_2_Methyl_butryl_CoA" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C26H41N7O17P3S</p></html>
  </notes>
</species>
  <species id="M_C16237_c" name="Protein N6-(lipoyl)lysine" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C8H14NORS2</p></html>
  </notes>
</species>
  <species id="M_C16238_c" name="Lipoyl-AMP" compartment="C_c">
  <notes>

```

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C18H25N5O8PS2</p></html>

</notes>

</species>

<species id="M\_C16240\_c" name="Apoprotein" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: H3NR</p></html>

</notes>

</species>

<species id="M\_C16254\_c" name="S-Succinyldihydrolipoamide|S-Succinyldihydrolipoamide-E|[Dihydrolipoyllysine-residue succinyltransferase] S-succinyldihydrolipoyllysine" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C12H20NO4S2</p></html>

</notes>

</species>

<species id="M\_C16255\_c" name="S-Acetyldihydrolipoamide|6-S-Acetyldihydrolipoamide|S-acetyldihydrolipoamide|[Dihydrolipoyllysine-residue acetyltransferase] S-acetyldihydrolipoyllysine|S-Acetyldihydrolipoamide-E" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C10H19NO2S2</p></html>

</notes>

</species>

<species id="M\_C16489\_c" name="Fructoselysine 6-phosphate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C12H25N2O10P</p></html>

</notes>

</species>

<species id="M\_C16519\_c" name="2-Succinyl-5-enolpyruvyl-6-hydroxy-3-cyclohexene-1-carboxylate" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C14H13O9</p></html>

</notes>

</species>

<species id="M\_C16636\_c" name="tRNA(Sec)" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>

</notes>

</species>

<species id="M\_C16684\_c" name="N-Acetoxyarylamine" compartment="C\_c">

```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H9NO2</p></html>
    </notes>
  </species>
  <species      id="M_C16688_c"      name="Sucrose      6-phosphate|Sucrose
6F-phosphate|sucrose-6-phosphate|sucrose
6-phosphate|Sucrose-6-phosphate|6-Phosphosucrose|6-O-Phosphonosucrose|beta-D-Fructofuranos
yl-6-O-phosphono-alpha-D-glucopyranoside" compartment="C_c">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C12H22O14P</p></html>
    </notes>
  </species>
  <species      id="M_C17949_c"      name="N-Acetyldemethylphosphinothricin|N-Adpt"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12NO5P</p></html>
    </notes>
  </species>
  <species      id="M_C17952_c"
name="N-Acetylphosphinothricin|L-N-Acetylphosphinothricin|N-Acetyl-L-Glufosinate|N-Acetyl
phinothricin" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H14NO5P</p></html>
    </notes>
  </species>
  <species      id="M_C17962_c"
name="Demethylphosphinothricin|(2S)-2-Amino-4-(hydroxyphosphinyl)butanoic      acid"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H10NO4P</p></html>
    </notes>
  </species>
  <species      id="M_cpd01048_c"      name="Arsenic      acid|Orthoarsenic      acid|Arsenate
ion|Arsenate|arsenate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: HO4As</p></html>
    </notes>
  </species>
  <species      id="M_cpd01048_e"      name="Arsenic      acid|Orthoarsenic      acid|Arsenate
ion|Arsenate|arsenate, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      HO4As,
extracellular</p></html>

```

```

    </notes>
</species>
  <species id="M_cpd11430_c" name="fa1|Fatty acid (Iso-C14:0)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C14H27O2</p></html>
    </notes>
  </species>
  <species id="M_cpd11431_c" name="fa1|Fatty acid (Iso-C17:0)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C17H33O2</p></html>
    </notes>
  </species>
  <species id="M_cpd11432_c" name="fa11coa|Iso-C17:0 CoA Isoheptadecanoyl-CoA"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C38H65N7O17P3S</p></html>
    </notes>
  </species>
  <species id="M_cpd11433_c" name="fa12|Fatty acid (Anteiso-C17:0)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C17H33O2</p></html>
    </notes>
  </species>
  <species id="M_cpd11434_c" name="fa12coa|Anteiso-C17:0 CoA
Anteisoheptadecanoyl-CoA" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C38H65N7O17P3S</p></html>
    </notes>
  </species>
  <species id="M_cpd11435_c" name="fa1coa|Iso-C14:0 CoA Isotetradecanoyl-CoA"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C35H59N7O17P3S</p></html>
    </notes>
  </species>
  <species id="M_cpd11436_c" name="fa3|Fatty acid (Iso-C15:0)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C15H29O2</p></html>
    </notes>
  </species>
  <species id="M_cpd11437_c" name="fa3coa|Iso-C15:0 CoA Isopentadecanoyl-CoA"

```



```

compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C36H61N7O17P3S</p></html>
    </notes>
</species>
  <species id="M_cpd11438_c" name="fa4|Fatty acid (Anteiso-C15:0)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C15H29O2</p></html>
    </notes>
  </species>
  <species
    id="M_cpd11439_c"
    name="fa4coa|Anteiso-C15:0
    CoA
Anteisopentadecanoyl-CoA" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C36H61N7O17P3S</p></html>
    </notes>
  </species>
  <species id="M_cpd11440_c" name="fa6|Fatty acid (iso-C16:0)" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C16H31O2</p></html>
    </notes>
  </species>
  <species id="M_cpd11441_c" name="fa6coa|Iso-C16:0 CoA Isohexadecanoyl-CoA"
compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C37H63N7O17P3S</p></html>
    </notes>
  </species>
  <species id="M_cpd11459_c" name="tcam|minor teichoic acid (acetylgalactosamine glucose
phosphate, n=30)" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C420H692N30O391P30</p></html>
    </notes>
  </species>
  <species id="M_cpd11462_c" name="mRNA" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
    </notes>
  </species>
  <species
    id="M_cpd11495_c"
    name="2-methylbutanoyl-ACP|2-methylbutyryl-ACP"
compartment="C_c">

```

```

    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C16H29N2O8PRS</p></html>
    </notes>
  </species>
  <species id="M_cpd11496_c" name="4-methyl-3-oxo-hexanoyl-ACP" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C18H31N2O9PRS</p></html>
    </notes>
  </species>
  <species id="M_cpd11497_c" name="4-methyl-3-hydroxy-hexanoyl-ACP"
compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C18H33N2O9PRS</p></html>
    </notes>
  </species>
  <species id="M_cpd11498_c" name="4-methyl-trans-hex-2-enoyl-ACP"
compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C18H31N2O8PRS</p></html>
    </notes>
  </species>
  <species id="M_cpd11499_c" name="4-methyl-hexanoyl-ACP" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C18H33N2O8PRS</p></html>
    </notes>
  </species>
  <species id="M_cpd11500_c" name="6-methyl-3-oxo-octanoyl-ACP" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H35N2O9PRS</p></html>
    </notes>
  </species>
  <species id="M_cpd11501_c" name="6-methyl-3-hydroxy-octanoyl-ACP"
compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H37N2O9PRS</p></html>
    </notes>
  </species>

```

```

    <species          id="M_cpd11502_c"          name="6-methyl-trans-oct-2-enoyl-ACP"
compartment="C_c">
    <notes>
    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H35N2O8PRS</p></html>
    </notes>
</species>
    <species id="M_cpd11503_c" name="6-methyl-octanoyl-ACP" compartment="C_c">
    <notes>
    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H37N2O8PRS</p></html>
    </notes>
</species>
    <species id="M_cpd11504_c" name="8-methyl-3-oxo-decanoyl-ACP" compartment="C_c">
    <notes>
    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C22H39N2O9PRS</p></html>
    </notes>
</species>
    <species          id="M_cpd11505_c"          name="8-methyl-3-hydroxy-decanoyl-ACP"
compartment="C_c">
    <notes>
    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C22H41N2O9PRS</p></html>
    </notes>
</species>
    <species          id="M_cpd11506_c"          name="8-methyl-trans-dec-2-enoyl-ACP"
compartment="C_c">
    <notes>
    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C22H39N2O8PRS</p></html>
    </notes>
</species>
    <species id="M_cpd11507_c" name="8-methyl-decanoyl-ACP" compartment="C_c">
    <notes>
    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C22H41N2O8PRS</p></html>
    </notes>
</species>
    <species          id="M_cpd11508_c"          name="10-methyl-3-oxo-dodecanoyl-ACP"
compartment="C_c">
    <notes>
    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C24H43N2O9PRS</p></html>

```

```

    </notes>
</species>
  <species id="M_cpd11509_c" name="10-methyl-3-hydroxy-dodecanoyl-ACP"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C24H45N2O9PRS</p></html>
    </notes>
</species>
  <species id="M_cpd11510_c" name="10-methyl-trans-dodec-2-enoyl-ACP"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C24H43N2O8PRS</p></html>
    </notes>
</species>
  <species id="M_cpd11511_c" name="10-methyl-dodecanoyl-ACP" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C24H45N2O8PRS</p></html>
    </notes>
</species>
  <species id="M_cpd11512_c" name="12-methyl-3-oxo-tetra-decanoyl-ACP"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C26H47N2O9PRS</p></html>
    </notes>
</species>
  <species id="M_cpd11513_c" name="12-methyl-3-hydroxy-tetra-decanoyl-ACP"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C26H49N2O9PRS</p></html>
    </notes>
</species>
  <species id="M_cpd11514_c" name="12-methyl-trans-tetra-dec-2-enoyl-ACP"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C26H47N2O8PRS</p></html>
    </notes>
</species>
  <species id="M_cpd11515_c" name="12-methyl-tetra-decanoyl-ACP" compartment="C_c">

```

```

      <notes>
      <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C26H49N2O8PRS</p></html>
      </notes>
</species>
    <species      id="M_cpd11516_c"      name="14-methyl-3-oxo-hexa-decanoyl-ACP"
compartment="C_c">
      <notes>
      <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C28H51N2O9PRS</p></html>
      </notes>
</species>
    <species      id="M_cpd11517_c"      name="14-methyl-3-hydroxy-hexa-decanoyl-ACP"
compartment="C_c">
      <notes>
      <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C28H53N2O9PRS</p></html>
      </notes>
</species>
    <species      id="M_cpd11518_c"      name="14-methyl-trans-hexa-dec-2-enoyl-ACP"
compartment="C_c">
      <notes>
      <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C28H51N2O8PRS</p></html>
      </notes>
</species>
    <species id="M_cpd11519_c" name="14-methyl-hexa-decanoyl-ACP" compartment="C_c">
      <notes>
      <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C28H53N2O8PRS</p></html>
      </notes>
</species>
    <species      id="M_cpd11520_c"      name="3-methylbutanoyl-ACP|isovaleryl-ACP"
compartment="C_c">
      <notes>
      <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C16H29N2O8PRS</p></html>
      </notes>
</species>
    <species id="M_cpd11521_c" name="5-methyl-3-oxo-hexanoyl-ACP" compartment="C_c">
      <notes>
      <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C18H31N2O9PRS</p></html>
      </notes>

```

```

</species>
  <species          id="M_cpd11522_c"          name="5-methyl-3-hydroxy-hexanoyl-ACP"
compartment="C_c">
  <notes>
    <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C18H33N2O9PRS</p></html>
  </notes>
</species>
  <species          id="M_cpd11523_c"          name="5-methyl-trans-hex-2-enoyl-ACP"
compartment="C_c">
  <notes>
    <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C18H31N2O8PRS</p></html>
  </notes>
</species>
  <species id="M_cpd11524_c" name="5-methyl-hexanoyl-ACP" compartment="C_c">
  <notes>
    <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C18H33N2O8PRS</p></html>
  </notes>
</species>
  <species id="M_cpd11525_c" name="7-methyl-3-oxo-octanoyl-ACP" compartment="C_c">
  <notes>
    <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H35N2O9PRS</p></html>
  </notes>
</species>
  <species          id="M_cpd11526_c"          name="7-methyl-3-hydroxy-octanoyl-ACP"
compartment="C_c">
  <notes>
    <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H37N2O9PRS</p></html>
  </notes>
</species>
  <species          id="M_cpd11527_c"          name="7-methyl-trans-oct-2-enoyl-ACP"
compartment="C_c">
  <notes>
    <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C20H35N2O8PRS</p></html>
  </notes>
</species>
  <species id="M_cpd11528_c" name="7-methyl-octanoyl-ACP" compartment="C_c">
  <notes>
    <html          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:

```

C20H37N2O8PRS</p></html>  
 </notes>  
</species>  
 <species id="M\_cpd11529\_c" name="9-methyl-3-oxo-decanoyl-ACP" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C22H39N2O9PRS</p></html>  
 </notes>  
</species>  
 <species id="M\_cpd11530\_c" name="9-methyl-3-hydroxy-decanoyl-ACP" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C22H41N2O9PRS</p></html>  
 </notes>  
</species>  
 <species id="M\_cpd11531\_c" name="9-methyl-trans-dec-2-enoyl-ACP" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C22H39N2O8PRS</p></html>  
 </notes>  
</species>  
 <species id="M\_cpd11532\_c" name="9-methyl-decanoyl-ACP" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C22H41N2O8PRS</p></html>  
 </notes>  
</species>  
 <species id="M\_cpd11533\_c" name="11-methyl-3-oxo-dodecanoyl-ACP" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C24H43N2O9PRS</p></html>  
 </notes>  
</species>  
 <species id="M\_cpd11534\_c" name="11-methyl-3-hydroxy-dodecanoyl-ACP" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C24H45N2O9PRS</p></html>  
 </notes>  
</species>  
 <species id="M\_cpd11535\_c" name="11-methyl-trans-dodec-2-enoyl-ACP"

```

compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C24H43N2O8PRS</p></html>
    </notes>
</species>
<species id="M_cpd11536_c" name="11-methyl-dodecanoyl-ACP" compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C24H45N2O8PRS</p></html>
    </notes>
</species>
<species id="M_cpd11537_c" name="13-methyl-3-oxo-tetra-decanoyl-ACP"
compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C26H47N2O9PRS</p></html>
    </notes>
</species>
<species id="M_cpd11538_c" name="13-methyl-3-hydroxy-tetra-decanoyl-ACP"
compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C26H49N2O9PRS</p></html>
    </notes>
</species>
<species id="M_cpd11539_c" name="13-methyl-trans-tetra-dec-2-enoyl-ACP"
compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C26H47N2O8PRS</p></html>
    </notes>
</species>
<species id="M_cpd11540_c" name="13-methyl-tetra-decanoyl-ACP" compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C26H49N2O8PRS</p></html>
    </notes>
</species>
<species id="M_cpd11541_c" name="15-methyl-3-oxo-hexa-decanoyl-ACP"
compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C28H51N2O9PRS</p></html>

```



```

    </notes>
</species>
  <species id="M_cpd11542_c" name="15-methyl-3-hydroxy-hexa-decanoyl-ACP"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C28H53N2O9PRS</p></html>
  </notes>
</species>
  <species id="M_cpd11543_c" name="15-methyl-trans-hexa-dec-2-enoyl-ACP"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C28H51N2O8PRS</p></html>
  </notes>
</species>
  <species id="M_cpd11544_c" name="15-methyl-hexa-decanoyl-ACP" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C28H53N2O8PRS</p></html>
  </notes>
</species>
  <species id="M_cpd11545_c" name="2-methylpropionyl-ACP|isobutyryl-ACP"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C15H27N2O8PRS</p></html>
  </notes>
</species>
  <species id="M_cpd11546_c" name="4-methyl-3-oxo-pentanoyl-ACP" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C17H29N2O9PRS</p></html>
  </notes>
</species>
  <species id="M_cpd11547_c" name="4-methyl-3-hydroxy-pentanoyl-ACP"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C17H31N2O9PRS</p></html>
  </notes>
</species>
  <species id="M_cpd11548_c" name="4-methyl-trans-pent-2-enoyl-ACP"
compartment="C_c">

```

```

      <notes>
      <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C17H29N2O8PRS</p></html>
      </notes>
    </species>
    <species id="M_cpd11549_c" name="4-methyl-pentanoyl-ACP" compartment="C_c">
      <notes>
      <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C17H31N2O8PRS</p></html>
      </notes>
    </species>
    <species id="M_cpd11550_c" name="6-methyl-3-oxo-heptanoyl-ACP" compartment="C_c">
      <notes>
      <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C19H33N2O9PRS</p></html>
      </notes>
    </species>
    <species
      id="M_cpd11551_c"
      name="6-methyl-3-hydroxy-heptanoyl-ACP"
      compartment="C_c">
      <notes>
      <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C19H35N2O9PRS</p></html>
      </notes>
    </species>
    <species
      id="M_cpd11552_c"
      name="6-methyl-trans-hept-2-enoyl-ACP"
      compartment="C_c">
      <notes>
      <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C19H33N2O8PRS</p></html>
      </notes>
    </species>
    <species id="M_cpd11553_c" name="6-methyl-heptanoyl-ACP" compartment="C_c">
      <notes>
      <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C19H35N2O8PRS</p></html>
      </notes>
    </species>
    <species id="M_cpd11554_c" name="8-methyl-3-oxo-nonanoyl-ACP" compartment="C_c">
      <notes>
      <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C21H37N2O9PRS</p></html>
      </notes>
    </species>
    <species
      id="M_cpd11555_c"
      name="8-methyl-3-hydroxy-nonanoyl-ACP"

```

```

compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C21H39N2O9PRS</p></html>
    </notes>
</species>
  <species id="M_cpd11556_c" name="8-methyl-trans-non-2-enoyl-ACP"
compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C21H37N2O8PRS</p></html>
    </notes>
</species>
  <species id="M_cpd11557_c" name="8-methyl-nonanoyl-ACP" compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C21H39N2O8PRS</p></html>
    </notes>
</species>
  <species id="M_cpd11558_c" name="10-methyl-3-oxo-undecanoyl-ACP"
compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C23H41N2O9PRS</p></html>
    </notes>
</species>
  <species id="M_cpd11559_c" name="10-methyl-3-hydroxy-undecanoyl-ACP"
compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C23H43N2O9PRS</p></html>
    </notes>
</species>
  <species id="M_cpd11560_c" name="10-methyl-trans-undec-2-enoyl-ACP"
compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C23H41N2O8PRS</p></html>
    </notes>
</species>
  <species id="M_cpd11561_c" name="10-methyl-undecanoyl-ACP" compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C23H43N2O8PRS</p></html>

```

```

    </notes>
</species>
  <species      id="M_cpd11562_c"      name="12-methyl-3-oxo-tridecanoyl-ACP"
compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C25H45N2O9PRS</p></html>
  </notes>
</species>
  <species      id="M_cpd11563_c"      name="12-methyl-3-hydroxy-tridecanoyl-ACP"
compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C25H47N2O9PRS</p></html>
  </notes>
</species>
  <species      id="M_cpd11564_c"      name="12-methyl-trans-tridec-2-enoyl-ACP"
compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C25H45N2O8PRS</p></html>
  </notes>
</species>
  <species id="M_cpd11565_c" name="12-methyl-tridecanoyl-ACP" compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C25H47N2O8PRS</p></html>
  </notes>
</species>
  <species      id="M_cpd11566_c"      name="14-methyl-3-oxo-pentadecanoyl-ACP"
compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C27H49N2O9PRS</p></html>
  </notes>
</species>
  <species      id="M_cpd11567_c"      name="14-methyl-3-hydroxy-pentadecanoyl-ACP"
compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C27H51N2O9PRS</p></html>
  </notes>
</species>
  <species      id="M_cpd11568_c"      name="14-methyl-trans-pentadec-2-enoyl-ACP"

```

```

compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C27H49N2O8PRS</p></html>
    </notes>
  </species>
  <species id="M_cpd11569_c" name="14-methyl-pentadecanoyl-ACP" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C27H51N2O8PRS</p></html>
      </notes>
    </species>
    <species id="M_cpd11570_c" name="3-Oxo-octodecanoyl-ACP" compartment="C_c">
      <notes>
        <html
          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C29H53N2O9PRS</p></html>
        </notes>
      </species>
      <species id="M_cpd11571_c" name="3-Hydroxy-octodecanoyl-ACP" compartment="C_c">
        <notes>
          <html
            xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C29H55N2O9PRS</p></html>
          </notes>
        </species>
        <species id="M_cpd11572_c" name="trans-Octodec-2-enoyl-ACP" compartment="C_c">
          <notes>
            <html
              xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C29H53N2O8PRS</p></html>
            </notes>
          </species>
          <species id="M_cpd11573_c" name="Octodecanoyl-ACP" compartment="C_c">
            <notes>
              <html
                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C29H55N2O8PRS</p></html>
              </notes>
            </species>
            <species id="M_cpd11575_c" name="MOPS|3-(n-Morpholino)Propanesulfonic Acid"
compartment="C_c">
              <notes>
                <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H14NO4S</p></html>
              </notes>
            </species>
            <species id="M_cpd11575_e" name="MOPS|3-(n-Morpholino)Propanesulfonic Acid,
extracellular" compartment="C_e">

```

```

    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C7H14NO4S,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_cpd11576_c" name="L-methionine R-oxide" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H11NO3S</p></html>
    </notes>
  </species>
  <species id="M_cpd11577_c" name="Lanthionine" compartment="C_c">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C6H10N2O4S</p></html>
    </notes>
  </species>
  <species id="M_cpd11577_e" name="Lanthionine, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C6H10N2O4S,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_cpd11578_c" name="hexanesulfonate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H13O3S</p></html>
    </notes>
  </species>
  <species id="M_cpd11578_e" name="hexanesulfonate, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C6H13O3S,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_cpd11579_c" name="ethanesulfonate|ethane sulfonate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C2H5O3S</p></html>
    </notes>
  </species>
  <species id="M_cpd11579_e" name="ethanesulfonate|ethane sulfonate, extracellular"
compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C2H5O3S,
extracellular</p></html>
    </notes>

```

```

</species>
  <species id="M_cpd11580_c" name="Gly-Gln" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H13N3O4</p></html>
    </notes>
  </species>
  <species id="M_cpd11580_e" name="Gly-Gln, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C7H13N3O4,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_cpd11581_c" name="gly-asn-L" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H11N3O4</p></html>
    </notes>
  </species>
  <species id="M_cpd11581_e" name="gly-asn-L, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C6H11N3O4,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_cpd11582_c" name="ala-L-Thr-L" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H14N2O4</p></html>
    </notes>
  </species>
  <species id="M_cpd11582_e" name="ala-L-Thr-L, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C7H14N2O4,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_cpd11583_c" name="Ala-Leu" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H18N2O3</p></html>
    </notes>
  </species>
  <species id="M_cpd11583_e" name="Ala-Leu, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C9H18N2O3,
extracellular</p></html>
    </notes>

```

```

</species>
  <species id="M_cpd11584_c" name="Ala-His" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C9H14N4O3</p></html>
    </notes>
  </species>
  <species id="M_cpd11584_e" name="Ala-His, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C9H14N4O3,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_cpd11585_c" name="L-alanylglycine" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H10N2O3</p></html>
    </notes>
  </species>
  <species id="M_cpd11585_e" name="L-alanylglycine, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C5H10N2O3,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_cpd11586_c" name="ala-L-glu-L" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H13N2O5</p></html>
    </notes>
  </species>
  <species id="M_cpd11586_e" name="ala-L-glu-L, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C8H13N2O5,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_cpd11587_c" name="Ala-Gln" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H15N3O4</p></html>
    </notes>
  </species>
  <species id="M_cpd11587_e" name="Ala-Gln, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C8H15N3O4,
extracellular</p></html>
    </notes>

```



```

</species>
  <species id="M_cpd11588_c" name="gly-pro-L" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H12N2O3</p></html>
    </notes>
  </species>
  <species id="M_cpd11588_e" name="gly-pro-L, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C7H12N2O3,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_cpd11589_c" name="gly-asp-L" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H9N2O5</p></html>
    </notes>
  </species>
  <species id="M_cpd11589_e" name="gly-asp-L, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C6H9N2O5,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_cpd11590_c" name="met-L-ala-L" compartment="C_c">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C8H15N2O3S</p></html>
    </notes>
  </species>
  <species id="M_cpd11590_e" name="met-L-ala-L, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C8H15N2O3S,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_cpd11591_c" name="Gly-Met" compartment="C_c">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C7H14N2O3S</p></html>
    </notes>
  </species>
  <species id="M_cpd11591_e" name="Gly-Met, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C7H14N2O3S,

```

```

extracellular</p></html>
  </notes>
</species>
  <species id="M_cpd11592_c" name="gly-glu-L" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H11N2O5</p></html>
    </notes>
  </species>
  <species id="M_cpd11592_e" name="gly-glu-L, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C7H11N2O5,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_cpd11593_c" name="ala-L-asp-L" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H11N2O5</p></html>
    </notes>
  </species>
  <species id="M_cpd11593_e" name="ala-L-asp-L, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C7H11N2O5,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_cpd11595_c" name="chromate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: H2O4Cr</p></html>
    </notes>
  </species>
  <species id="M_cpd11595_e" name="chromate, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      H2O4Cr,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_cpd11596_c" name="butanesulfonate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H9O3S</p></html>
    </notes>
  </species>
  <species id="M_cpd11596_e" name="butanesulfonate, extracellular" compartment="C_e">
    <notes>
      <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C4H9O3S,

```

```

extracellular</p></html>
  </notes>
</species>
  <species id="M_cpd11597_c" name="ARSENOBETAINE" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H11O2As</p></html>
    </notes>
  </species>
  <species id="M_cpd11597_e" name="ARSENOBETAINE, extracellular"
compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C5H11O2As,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_cpd11598_c" name="Antimonite" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Sb</p></html>
    </notes>
  </species>
  <species id="M_cpd11598_e" name="Antimonite, extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: Sb,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_cpd11599_c" name="3-aminobutanoic acid" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H9NO2</p></html>
    </notes>
  </species>
  <species id="M_cpd11599_e" name="3-aminobutanoic acid, extracellular"
compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H9NO2,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_cpd11606_c" name="Menaquinone 7" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C46H64O2</p></html>
    </notes>
  </species>
  <species id="M_cpd15237_c" name="hexadecenoate|Hexadecenoate|Hexadecenoate

```

```

(n-C16:1)|hexadecenoate (n-C16:1)" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C16H29O2</p></html>
  </notes>
</species>
  <species id="M_cpd15238_c" name="Hexadecenoyl-CoA|Hexadecenoyl-CoA (n-C16:1CoA)"
compartment="C_c">
  <notes>
    <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C37H61N7O17P3S</p></html>
  </notes>
</species>
  <species id="M_cpd15269_c" name="octadecenoate|octadecenoate (n-C18:1)"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C18H33O2</p></html>
  </notes>
</species>
  <species id="M_cpd15274_c" name="Octadecenoyl-CoA|Octadecenoyl-CoA (n-C18:1CoA)"
compartment="C_c">
  <notes>
    <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C39H65N7O17P3S</p></html>
  </notes>
</species>
  <species id="M_cpd15302_c" name="glycogen(n-1)|glycogenminusone"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C24H42O21</p></html>
  </notes>
</species>
  <species id="M_cpd15307_c" name="1,2-Diacyl-sn-glycerol ditetradecanoyl"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C31H60O5</p></html>
  </notes>
</species>
  <species id="M_cpd15309_c" name="1,2-Diacyl-sn-glycerol
dihexadecanoyl|1,2-Diacyl-sn-glycerol (dihexadecanoyl, n-C16:0)" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C35H68O5</p></html>
  </notes>
</species>
  <species id="M_cpd15311_c" name="1,2-Diacyl-sn-glycerol dioctadecanoyl"

```

```

compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C39H76O5</p></html>
  </notes>
</species>
  <species id="M_cpd15327_c" name="1-hexadecanoyl-sn-glycerol 3-phosphate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C19H38O7P</p></html>
  </notes>
</species>
  <species id="M_cpd15329_c" name="1-octadecanoyl-sn-glycerol 3-phosphate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C21H42O7P</p></html>
  </notes>
</species>
  <species id="M_cpd15331_c" name="1-tetradecanoyl-sn-glycerol 3-phosphate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C17H34O7P</p></html>
  </notes>
</species>
  <species id="M_cpd15385_c" name="L-alanine-D-glutamate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H13N2O5</p></html>
  </notes>
</species>
  <species id="M_cpd15388_c" name="L-alanine-L-glutamate" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H13N2O5</p></html>
  </notes>
</species>
  <species id="M_cpd15390_c" name="N-Acetyl-D-galactosamine 1-phosphate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C8H15NO9P</p></html>
  </notes>
</species>
  <species id="M_cpd15419_c" name="CDP-1,2-dihexadecanoylglycerol"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C44H79N3O15P2</p></html>

```

```

    </notes>
</species>
  <species      id="M_cpd15421_c"      name="CDP-1,2-dioctadecanoylglycerol"
compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C48H87N3O15P2</p></html>
  </notes>
</species>
  <species      id="M_cpd15423_c"      name="CDP-1,2-ditetradecanoylglycerol"
compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C40H71N3O15P2</p></html>
  </notes>
</species>
  <species id="M_cpd15471_c" name="gamma-butyrobetaine" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H15NO2</p></html>
  </notes>
</species>
  <species      id="M_cpd15471_e"      name="gamma-butyrobetaine,      extracellular"
compartment="C_e">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:      C7H15NO2,
extracellular</p></html>
  </notes>
</species>
  <species      id="M_cpd15522_c"      name="1,2-ditetradecanoyl-sn-glycerol      3-phosphate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C31H60O8P</p></html>
  </notes>
</species>
  <species      id="M_cpd15524_c"      name="1,2-dihexadecanoyl-sn-glycerol      3-phosphate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C35H68O8P</p></html>
  </notes>
</species>
  <species      id="M_cpd15526_c"      name="1,2-dioctadecanoyl-sn-glycerol      3-phosphate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C39H76O8P</p></html>

```

```

    </notes>
</species>
  <species id="M_cpd15529_c" name="phosphatidylethanolamine ditetradecanoyl"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C33H66NO8P</p></html>
  </notes>
</species>
  <species id="M_cpd15531_c" name="phosphatidylethanolamine
dihexadecanoyl|phosphatidylethanolamine (dihexadecanoyl, n-C16:0)" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C37H74NO8P</p></html>
  </notes>
</species>
  <species id="M_cpd15533_c" name="phosphatidylethanolamine
dioctadecanoyl|phosphatidylethanolamine (dioctadecanoyl, n-C18:0)" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C41H82NO8P</p></html>
  </notes>
</species>
  <species id="M_cpd15536_c" name="Phosphatidylglycerol ditetradecanoyl"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C34H66O10P</p></html>
  </notes>
</species>
  <species id="M_cpd15538_c" name="Phosphatidylglycerol
dihexadecanoyl|Phosphatidylglycerol (dihexadecanoyl, n-C16:0)" compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C38H74O10P</p></html>
  </notes>
</species>
  <species id="M_cpd15540_c" name="Phosphatidylglycerol dioctadecanoyl"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C42H82O10P</p></html>
  </notes>
</species>

```

```

    <species id="M_cpd15543_c" name="Phosphatidylglycerophosphate ditetradecanoyl"
    compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
        C34H66O13P2</p></html>
      </notes>
    </species>
    <species id="M_cpd15545_c" name="Phosphatidylglycerophosphate
    dihexadecanoyl|Phosphatidylglycerophosphate (dihexadecanoyl, n-C16:0)" compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
        C38H74O13P2</p></html>
      </notes>
    </species>
    <species id="M_cpd15547_c" name="Phosphatidylglycerophosphate dioctadecanoyl"
    compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
        C42H82O13P2</p></html>
      </notes>
    </species>
    <species id="M_cpd15553_c" name="phosphatidylserine ditetradecanoyl"
    compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
        C34H64NO10P</p></html>
      </notes>
    </species>
    <species id="M_cpd15555_c" name="phosphatidylserine dihexadecanoyl|phosphatidylserine
    (dihexadecanoyl, n-C16:0)" compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
        C38H72NO10P</p></html>
      </notes>
    </species>
    <species id="M_cpd15557_c" name="phosphatidylserine dioctadecanoyl|phosphatidylserine
    (dioctadecanoyl, n-C18:0)" compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
        C42H80NO10P</p></html>
      </notes>
    </species>
    <species id="M_cpd15584_c" name="alpha-Methyl-D-glucoside" compartment="C_c">
      <notes>

```



```

    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H14O6</p></html>
  </notes>
</species>
  <species id="M_cpd15585_c" name="beta-Methylglucoside" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H14O6</p></html>
    </notes>
  </species>
  <species id="M_cpd15585_e" name="beta-Methylglucoside, extracellular"
compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H14O6,
extracellular</p></html>
    </notes>
  </species>
  <species id="M_cpd15596_c" name="Dipicolinate|dipicolinate" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C7H3NO4</p></html>
    </notes>
  </species>
  <species id="M_cpd15607_c" name="Heme D" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C34H28FeN4O10</p></html>
    </notes>
  </species>
  <species id="M_cpd15611_c" name="hexanal" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O</p></html>
    </notes>
  </species>
  <species id="M_cpd15634_c" name="teichuronic acid (GlcA + GalNac, 45 repeating unit)"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C630H945N45O630P45</p></html>
    </notes>
  </species>
  <species id="M_cpd15661_c"
name="45(Phosphoglyceryl)-N-Acetyl-beta-D-mannosaminy1-1,4-N-acetyl-D-glucosaminyldipho
sphoundecaprenol|Prenol-45n teichoic acid" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C206H386N2O242P47</p></html>

```

```

    </notes>
</species>
    <species id="M_cpd15662_c"
name="45(Glucosyl-phosphoglyceryl)-N-Acetyl-beta-D-mannosaminyl-1,4-N-acetyl-D-glucosamin
inyldiphosphoundecaprenol|Prenol-45n teichoic acid-glucose substituted" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C476H836N2O467P47</p></html>
    </notes>
</species>
    <species id="M_cpd15663_c"
name="45(Alaninyl-phosphoglyceryl)-N-Acetyl-beta-D-mannosaminyl-1,4-N-acetyl-D-glucosamin
inyldiphosphoundecaprenol|Prenol-45n teichoic acid-alanine substituted" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C341H611N47O287P47</p></html>
    </notes>
</species>
    <species id="M_cpd15664_c" name="Cell wall of B. subtilis" compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
    </notes>
</species>
    <species id="M_cpd15665_c" name="Peptidoglycan polymer (n subunits)"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C80H125N16O42R</p></html>
    </notes>
</species>
    <species id="M_cpd15666_c" name="Peptidoglycan polymer (n-1 subunits)"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C40H63N8O21R</p></html>
    </notes>
</species>
    <species id="M_cpd15667_c" name="glycerol teichoic acid (n=45), linked, unsubstituted"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C191H359N10O259P46R</p></html>
    </notes>
</species>

```

```

    <species id="M_cpd15668_c" name="glycerol teichoic acid (n=45), linked, D-ala substituted"
    compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
        C326H584N55O304P46R</p></html>
      </notes>
    </species>
    <species id="M_cpd15669_c" name="glycerol teichoic acid (n=45), linked, glucose
    substituted" compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
        C461H809N10O484P46R</p></html>
      </notes>
    </species>
    <species id="M_cpd15670_c" name="Lipoteichoic acid content" compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
      </notes>
    </species>
    <species id="M_cpd15671_c" name="1-isoheptadecanoyl-sn-glycerol 3-phosphate"
    compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C20H40O7P</p></html>
      </notes>
    </species>
    <species id="M_cpd15672_c" name="1-anteisoheptadecanoyl-sn-glycerol 3-phosphate"
    compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C20H40O7P</p></html>
      </notes>
    </species>
    <species id="M_cpd15673_c" name="1-isotetradecanoyl-sn-glycerol 3-phosphate"
    compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C17H34O7P</p></html>
      </notes>
    </species>
    <species id="M_cpd15674_c" name="1-isopentadecanoyl-sn-glycerol 3-phosphate"
    compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C18H36O7P</p></html>
      </notes>
    </species>
    <species id="M_cpd15675_c" name="1-anteisopentadecanoyl-sn-glycerol 3-phosphate"

```

```

compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C18H36O7P</p></html>
  </notes>
</species>
  <species id="M_cpd15676_c" name="1-isoheptadecanoyl-sn-glycerol 3-phosphate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C19H38O7P</p></html>
  </notes>
</species>
  <species id="M_cpd15677_c" name="1,2-diisooctadecanoyl-sn-glycerol 3-phosphate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C37H72O8P</p></html>
  </notes>
</species>
  <species id="M_cpd15678_c" name="1,2-dianteisoheptadecanoyl-sn-glycerol 3-phosphate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C37H72O8P</p></html>
  </notes>
</species>
  <species id="M_cpd15679_c" name="1,2-diisotetradecanoyl-sn-glycerol 3-phosphate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C31H60O8P</p></html>
  </notes>
</species>
  <species id="M_cpd15680_c" name="1,2-diisopentadecanoyl-sn-glycerol 3-phosphate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C33H64O8P</p></html>
  </notes>
</species>
  <species id="M_cpd15681_c" name="1,2-dianteisopentadecanoyl-sn-glycerol 3-phosphate"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C33H64O8P</p></html>
  </notes>
</species>
  <species id="M_cpd15682_c" name="1,2-diisohexadecanoyl-sn-glycerol 3-phosphate"
compartment="C_c">
  <notes>

```

```

    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C35H68O8P</p></html>
  </notes>
</species>
  <species      id="M_cpd15683_c"      name="CDP-1,2-diisoheptadecanoylglycerol"
  compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C46H83N3O15P2</p></html>
      </notes>
    </species>
      <species      id="M_cpd15684_c"      name="CDP-1,2-dianteisoheptadecanoylglycerol"
      compartment="C_c">
        <notes>
          <html
            xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C46H83N3O15P2</p></html>
          </notes>
        </species>
          <species      id="M_cpd15685_c"      name="CDP-1,2-diisotetradecanoylglycerol"
          compartment="C_c">
            <notes>
              <html
                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C40H71N3O15P2</p></html>
              </notes>
            </species>
              <species      id="M_cpd15686_c"      name="CDP-1,2-diisopentadecanoylglycerol"
              compartment="C_c">
                <notes>
                  <html
                    xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C42H75N3O15P2</p></html>
                  </notes>
                </species>
                  <species      id="M_cpd15687_c"      name="CDP-1,2-dianteisopentadecanoylglycerol"
                  compartment="C_c">
                    <notes>
                      <html
                        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C42H75N3O15P2</p></html>
                      </notes>
                    </species>
                      <species      id="M_cpd15688_c"      name="CDP-1,2-diisohexadecanoylglycerol"
                      compartment="C_c">
                        <notes>
                          <html
                            xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C44H79N3O15P2</p></html>
                          </notes>

```

```

</species>
  <species      id="M_cpd15689_c"      name="Diisoheptadecanoylphosphatidylserine"
compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C40H76NO10P</p></html>
  </notes>
</species>
  <species      id="M_cpd15690_c"      name="Dianteisoheptadecanoylphosphatidylserine"
compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C40H76NO10P</p></html>
  </notes>
</species>
  <species      id="M_cpd15691_c"      name="Diisotetradecanoylphosphatidylserine"
compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C34H64NO10P</p></html>
  </notes>
</species>
  <species      id="M_cpd15692_c"      name="Diisopentadecanoylphosphatidylserine"
compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C36H68NO10P</p></html>
  </notes>
</species>
  <species      id="M_cpd15693_c"      name="Dianteisopentadecanoylphosphatidylserine"
compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C36H68NO10P</p></html>
  </notes>
</species>
  <species      id="M_cpd15694_c"      name="Diisohexadecanoylphosphatidylserine"
compartment="C_c">
  <notes>
    <html      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C38H72NO10P</p></html>
  </notes>
</species>
  <species      id="M_cpd15695_c"      name="Diisoheptadecanoylphosphatidylethanolamine"

```

```

compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C39H78NO8P</p></html>
    </notes>
</species>
  <species id="M_cpd15696_c" name="Dianteisoheptadecanoylphosphatidylethanolamine"
compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C39H78NO8P</p></html>
    </notes>
</species>
  <species id="M_cpd15697_c" name="Diisotetradecanoylphosphatidylethanolamine"
compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C33H66NO8P</p></html>
    </notes>
</species>
  <species id="M_cpd15698_c" name="Diisopentadecanoylphosphatidylethanolamine"
compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C35H70NO8P</p></html>
    </notes>
</species>
  <species id="M_cpd15699_c" name="Dianteisopentadecanoylphosphatidylethanolamine"
compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C35H70NO8P</p></html>
    </notes>
</species>
  <species id="M_cpd15700_c" name="Diisohexadecanoylphosphatidylethanolamine"
compartment="C_c">
  <notes>
    <html
      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C37H74NO8P</p></html>
    </notes>
</species>
  <species id="M_cpd15701_c" name="1,2-Diisoheptadecanoyl-sn-glycerol"
compartment="C_c">
  <notes>

```

```

      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C37H72O5</p></html>
    </notes>
  </species>
  <species      id="M_cpd15702_c"      name="1,2-Dianteisoheptadecanoyl-sn-glycerol"
  compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C37H72O5</p></html>
    </notes>
  </species>
  <species      id="M_cpd15703_c"      name="1,2-Diisotetradecanoyl-sn-glycerol"
  compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C31H60O5</p></html>
    </notes>
  </species>
  <species      id="M_cpd15704_c"      name="1,2-Diisopentadecanoyl-sn-glycerol"
  compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C33H64O5</p></html>
    </notes>
  </species>
  <species      id="M_cpd15705_c"      name="1,2-Dianteisopentadecanoyl-sn-glycerol"
  compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C33H64O5</p></html>
    </notes>
  </species>
  <species      id="M_cpd15706_c"      name="1,2-Diisohexadecanoyl-sn-glycerol"
  compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C35H68O5</p></html>
    </notes>
  </species>
  <species      id="M_cpd15707_c"      name="Triglucoyl-1,2      dipalmitoylglycerol"
  compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C53H98O20</p></html>
    </notes>
  </species>
  <species      id="M_cpd15708_c"      name="Triglucoyl-1,2      dimyristoylglycerol"
  compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C49H90O20</p></html>
    </notes>

```



```

</species>
  <species      id="M_cpd15709_c"      name="Triglucosyl-1,2      distearoylglycerol"
compartment="C_c">
  <notes>
    <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C57H106O20</p></html>
  </notes>
</species>
  <species      id="M_cpd15710_c"      name="Triglucosyl-1,2      diisoheptadecanoylglycerol"
compartment="C_c">
  <notes>
    <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C55H102O20</p></html>
  </notes>
</species>
  <species      id="M_cpd15711_c"      name="Triglucosyl-1,2      dianteisoheptadecanoylglycerol"
compartment="C_c">
  <notes>
    <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C55H102O20</p></html>
  </notes>
</species>
  <species      id="M_cpd15712_c"      name="Triglucosyl-1,2      diisotetradecanoylglycerol"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C49H90O20</p></html>
  </notes>
</species>
  <species      id="M_cpd15713_c"      name="Triglucosyl-1,2      diisopentadecanoylglycerol"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C51H94O20</p></html>
  </notes>
</species>
  <species      id="M_cpd15714_c"      name="Triglucosyl-1,2      dianteisopentadecanoylglycerol"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C51H94O20</p></html>
  </notes>
</species>
  <species      id="M_cpd15715_c"      name="Triglucosyl-1,2      diisohexadecanoylglycerol"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C53H98O20</p></html>

```

```

    </notes>
</species>
  <species id="M_cpd15716_c" name="Diisoheptadecanoylphosphatidylglycerophosphate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C40H78O13P2</p></html>
    </notes>
</species>
  <species id="M_cpd15717_c" name="Dianteisoheptadecanoylphosphatidylglycerophosphate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C40H78O13P2</p></html>
    </notes>
</species>
  <species id="M_cpd15718_c" name="Diisotetradecanoylphosphatidylglycerophosphate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C34H66O13P2</p></html>
    </notes>
</species>
  <species id="M_cpd15719_c" name="Diisopentadecanoylphosphatidylglycerophosphate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C36H70O13P2</p></html>
    </notes>
</species>
  <species id="M_cpd15720_c" name="Dianteisopentadecanoylphosphatidylglycerophosphate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C36H70O13P2</p></html>
    </notes>
</species>
  <species id="M_cpd15721_c" name="Diisohexadecanoylphosphatidylglycerophosphate"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C38H74O13P2</p></html>
    </notes>
</species>

```

```

    <species      id="M_cpd15722_c"      name="Diisoheptadecanoylphosphatidylglycerol"
compartment="C_c">
    <notes>
    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C40H78O10P</p></html>
    </notes>
</species>
    <species      id="M_cpd15723_c"      name="Dianteisoheptadecanoylphosphatidylglycerol"
compartment="C_c">
    <notes>
    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C40H78O10P</p></html>
    </notes>
</species>
    <species      id="M_cpd15724_c"      name="Diisotetradecanoylphosphatidylglycerol"
compartment="C_c">
    <notes>
    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C34H66O10P</p></html>
    </notes>
</species>
    <species      id="M_cpd15725_c"      name="Diisopentadecanoylphosphatidylglycerol"
compartment="C_c">
    <notes>
    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C36H70O10P</p></html>
    </notes>
</species>
    <species      id="M_cpd15726_c"      name="Dianteisopentadecanoylphosphatidylglycerol"
compartment="C_c">
    <notes>
    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C36H70O10P</p></html>
    </notes>
</species>
    <species      id="M_cpd15727_c"      name="Diisohexadecanoylphosphatidylglycerol"
compartment="C_c">
    <notes>
    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C38H74O10P</p></html>
    </notes>
</species>
    <species      id="M_cpd15728_c"      name="Diglucosyl-1,2      dipalmitoylglycerol"
compartment="C_c">

```

```

      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C47H88O15</p></html>
      </notes>
    </species>
    <species      id="M_cpd15729_c"      name="Diglucosyl-1,2      dimyristoylglycerol"
    compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C43H80O15</p></html>
      </notes>
    </species>
    <species      id="M_cpd15730_c"      name="Diglucosyl-1,2      distearoylglycerol"
    compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C51H96O15</p></html>
      </notes>
    </species>
    <species      id="M_cpd15731_c"      name="Diglucosyl-1,2      diisoheptadecanoylglycerol"
    compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C49H92O15</p></html>
      </notes>
    </species>
    <species      id="M_cpd15732_c"      name="Diglucosyl-1,2      dianteisoheptadecanoylglycerol"
    compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C49H92O15</p></html>
      </notes>
    </species>
    <species      id="M_cpd15733_c"      name="Diglucosyl-1,2      diisotetradecanoylglycerol"
    compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C43H80O15</p></html>
      </notes>
    </species>
    <species      id="M_cpd15734_c"      name="Diglucosyl-1,2      diisopentadecanoylglycerol"
    compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C45H84O15</p></html>
      </notes>
    </species>
    <species      id="M_cpd15735_c"      name="Diglucosyl-1,2      dianteisopentadecanoylglycerol"
    compartment="C_c">
      <notes>
        <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C45H84O15</p></html>

```

```

    </notes>
</species>
  <species id="M_cpd15736_c" name="Diglucosyl-1,2 diisohexadecanoylglycerol"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C47H88O15</p></html>
  </notes>
</species>
  <species id="M_cpd15737_c" name="Monoglucosyl-1,2 dipalmitoylglycerol"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C41H78O10</p></html>
  </notes>
</species>
  <species id="M_cpd15738_c" name="Monoglucosyl-1,2 dimyristoylglycerol"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C37H70O10</p></html>
  </notes>
</species>
  <species id="M_cpd15739_c" name="Monoglucosyl-1,2 distearoylglycerol"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C45H86O10</p></html>
  </notes>
</species>
  <species id="M_cpd15740_c" name="Monoglucosyl-1,2 diisoheptadecanoylglycerol"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C43H82O10</p></html>
  </notes>
</species>
  <species id="M_cpd15741_c" name="Monoglucosyl-1,2 dianteisoheptadecanoylglycerol"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C43H82O10</p></html>
  </notes>
</species>
  <species id="M_cpd15742_c" name="Monoglucosyl-1,2 diisotetradecanoylglycerol"
compartment="C_c">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C37H70O10</p></html>
  </notes>
</species>

```

```

    <species id="M_cpd15743_c" name="Monoglucosyl-1,2 diisopentadecanoylglycerol"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C39H74O10</p></html>
    </notes>
</species>
    <species id="M_cpd15744_c" name="Monoglucosyl-1,2 dianteisopentadecanoylglycerol"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C39H74O10</p></html>
    </notes>
</species>
    <species id="M_cpd15745_c" name="Monoglucosyl-1,2 diisohexadecanoylglycerol"
compartment="C_c">
    <notes>
    <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C41H78O10</p></html>
    </notes>
</species>
    <species id="M_cpd15746_c" name="Palmitoyllipoteichoic acid (n=24), linked,
unsubstituted" compartment="C_c">
    <notes>
    <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C119H232O135P24</p></html>
    </notes>
</species>
    <species id="M_cpd15747_c" name="Myristoyllipoteichoic acid (n=24), linked,
unsubstituted" compartment="C_c">
    <notes>
    <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C115H224O135P24</p></html>
    </notes>
</species>
    <species id="M_cpd15748_c" name="Stearoyllipoteichoic acid (n=24), linked, unsubstituted"
compartment="C_c">
    <notes>
    <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C123H240O135P24</p></html>
    </notes>
</species>
    <species id="M_cpd15749_c" name="Isoheptadecanoyllipoteichoic acid (n=24), linked,
unsubstituted" compartment="C_c">
    <notes>
    <html
                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C121H236O135P24</p></html>

```

```

    </notes>
  </species>
  <species id="M_cpd15750_c" name="Anteisoheptadecanoyllipoteichoic acid (n=24), linked,
unsubstituted" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C121H236O135P24</p></html>
    </notes>
  </species>
  <species id="M_cpd15751_c" name="Isotetradecanoyllipoteichoic acid (n=24), linked,
unsubstituted" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C115H224O135P24</p></html>
    </notes>
  </species>
  <species id="M_cpd15752_c" name="Isopentadecanoyllipoteichoic acid (n=24), linked,
unsubstituted" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C117H228O135P24</p></html>
    </notes>
  </species>
  <species id="M_cpd15753_c" name="Anteisopentadecanoyllipoteichoic acid (n=24), linked,
unsubstituted" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C117H228O135P24</p></html>
    </notes>
  </species>
  <species id="M_cpd15754_c" name="Isohexadecanoyllipoteichoic acid (n=24), linked,
unsubstituted" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C119H232O135P24</p></html>
    </notes>
  </species>
  <species id="M_cpd15755_c" name="Palmitoyllipoteichoic acid (n=24), linked, glucose
substituted" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C263H472O255P24</p></html>
    </notes>
  </species>

```

<species id="M\_cpd15756\_c" name="Myristoyllipoteichoic acid (n=24), linked, glucose substituted" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C259H464O255P24</p></html>

</notes>

</species>

<species id="M\_cpd15757\_c" name="Stearoyllipoteichoic acid (n=24), linked, glucose substituted" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C267H480O255P24</p></html>

</notes>

</species>

<species id="M\_cpd15758\_c" name="Isoheptadecanoyllipoteichoic acid (n=24), linked, glucose substituted" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C265H476O255P24</p></html>

</notes>

</species>

<species id="M\_cpd15759\_c" name="Anteisoheptadecanoyllipoteichoic acid (n=24), linked, glucose substituted" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C265H476O255P24</p></html>

</notes>

</species>

<species id="M\_cpd15760\_c" name="Isotetradecanoyllipoteichoic acid (n=24), linked, glucose substituted" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C259H464O255P24</p></html>

</notes>

</species>

<species id="M\_cpd15761\_c" name="Isopentadecanoyllipoteichoic acid (n=24), linked, glucose substituted" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C261H468O255P24</p></html>

</notes>

</species>

<species id="M\_cpd15762\_c" name="Anteisopentadecanoyllipoteichoic acid (n=24), linked, glucose substituted" compartment="C\_c">



```

      <notes>
        <html
          xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C261H468O255P24</p></html>
        </notes>
      </species>
      <species id="M_cpd15763_c" name="Isohexadecanoyllipoteichoic acid (n=24), linked,
glucose substituted" compartment="C_c">
        <notes>
          <html
            xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C263H472O255P24</p></html>
          </notes>
        </species>
        <species id="M_cpd15764_c" name="Palmitoyllipoteichoic acid (n=24), linked,
N-acetyl-D-glucosamine" compartment="C_c">
          <notes>
            <html
              xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C311H544N24O255P24</p></html>
            </notes>
          </species>
          <species id="M_cpd15765_c" name="Myristoyllipoteichoic acid (n=24), linked,
N-acetyl-D-glucosamine" compartment="C_c">
            <notes>
              <html
                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C307H536N24O255P24</p></html>
              </notes>
            </species>
            <species id="M_cpd15766_c" name="Stearoyllipoteichoic acid (n=24), linked,
N-acetyl-D-glucosamine" compartment="C_c">
              <notes>
                <html
                  xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C315H552N24O255P24</p></html>
                </notes>
              </species>
              <species id="M_cpd15767_c" name="Isoheptadecanoyllipoteichoic acid (n=24), linked,
N-acetyl-D-glucosamine" compartment="C_c">
                <notes>
                  <html
                    xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C313H548N24O255P24</p></html>
                  </notes>
                </species>
                <species id="M_cpd15768_c" name="Anteisoheptadecanoyllipoteichoic acid (n=24), linked,
N-acetyl-D-glucosamine" compartment="C_c">
                  <notes>
                    <html
                      xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:

```

C313H548N24O255P24</p></html>  
 </notes>  
</species>  
 <species id="M\_cpd15769\_c" name="Isotetradecanoyllipoteichoic acid (n=24), linked, N-acetyl-D-glucosamine" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C307H536N24O255P24</p></html>  
 </notes>  
</species>  
 <species id="M\_cpd15770\_c" name="Isopentadecanoyllipoteichoic acid (n=24), linked, N-acetyl-D-glucosamine" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C309H540N24O255P24</p></html>  
 </notes>  
</species>  
 <species id="M\_cpd15771\_c" name="Anteisopentadecanoyllipoteichoic acid (n=24), linked, N-acetyl-D-glucosamine" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C309H540N24O255P24</p></html>  
 </notes>  
</species>  
 <species id="M\_cpd15772\_c" name="Isohexadecanoyllipoteichoic acid (n=24), linked, N-acetyl-D-glucosamine" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C311H544N24O255P24</p></html>  
 </notes>  
</species>  
 <species id="M\_cpd15773\_c" name="Palmitoyllipoteichoic acid (n=24), linked, D-alanine substituted" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C191H352N24O159P24</p></html>  
 </notes>  
</species>  
 <species id="M\_cpd15774\_c" name="Myristoyllipoteichoic acid (n=24), linked, D-alanine substituted" compartment="C\_c">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
 C187H342N24O159P24</p></html>  
 </notes>

```

</species>
  <species id="M_cpd15775_c" name="Stearoyllipoteichoic acid (n=24), linked, D-alanine
substituted" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C195H360N24O159P24</p></html>
    </notes>
  </species>
  <species id="M_cpd15776_c" name="Isoheptadecanoyllipoteichoic acid (n=24), linked,
D-alanine substituted" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C193H356N24O159P24</p></html>
    </notes>
  </species>
  <species id="M_cpd15777_c" name="Anteisoheptadecanoyllipoteichoic acid (n=24), linked,
D-alanine substituted" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C193H356N24O159P24</p></html>
    </notes>
  </species>
  <species id="M_cpd15778_c" name="Isotetradecanoyllipoteichoic acid (n=24), linked,
D-alanine substituted" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C187H344N24O159P24</p></html>
    </notes>
  </species>
  <species id="M_cpd15779_c" name="Isopentadecanoyllipoteichoic acid (n=24), linked,
D-alanine substituted" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C189H348N24O159P24</p></html>
    </notes>
  </species>
  <species id="M_cpd15780_c" name="Anteisopentadecanoyllipoteichoic acid (n=24), linked,
D-alanine substituted" compartment="C_c">
    <notes>
      <html
        xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C189H349N24O159P24</p></html>
    </notes>
  </species>
  <species id="M_cpd15781_c" name="Isohexadecanoyllipoteichoic acid (n=24), linked,

```

D-alanine substituted" compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C191H352N24O159P24</p></html>

</notes>

</species>

<species id="M\_cpd15782\_c" name="Palmitoyllysylphosphatidylglycerol"  
compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C44H88N2O11P</p></html>

</notes>

</species>

<species id="M\_cpd15783\_c" name="Myristoyllysylphosphatidylglycerol"  
compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C40H80N2O11P</p></html>

</notes>

</species>

<species id="M\_cpd15784\_c" name="Stearoyllysylphosphatidylglycerol"  
compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C48H96N2O11P</p></html>

</notes>

</species>

<species id="M\_cpd15785\_c" name="Isoheptadecanoyllysylphosphatidylglycerol"  
compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C46H92N2O11P</p></html>

</notes>

</species>

<species id="M\_cpd15786\_c" name="Anteisoheptadecanoyllysylphosphatidylglycerol"  
compartment="C\_c">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:  
C46H92N2O11P</p></html>

</notes>

</species>

<species id="M\_cpd15787\_c" name="Isotetradecanoyllysylphosphatidylglycerol"  
compartment="C\_c">

<notes>

```

    <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C40H80N2O11P</p></html>
    </notes>
</species>
    <species      id="M_cpd15788_c"      name="Isopentadecanoyllysylphosphatidylglycerol"
compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C42H84N2O11P</p></html>
        </notes>
    </species>
    <species      id="M_cpd15789_c"      name="Anteisopentadecanoyllysylphosphatidylglycerol"
compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C42H84N2O11P</p></html>
        </notes>
    </species>
    <species      id="M_cpd15790_c"      name="Isohexadecanoyllysylphosphatidylglycerol"
compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C44H88N2O11P</p></html>
        </notes>
    </species>
    <species      id="M_cpd15791_c"      name="Palmitoylcardiolipin      (B.      subtilis)"
compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C73H140O17P2</p></html>
        </notes>
    </species>
    <species      id="M_cpd15792_c"      name="Myristoylcardiolipin      (B.      subtilis)"
compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C65H124O17P2</p></html>
        </notes>
    </species>
    <species id="M_cpd15793_c" name="Stearoylcardiolipin (B. subtilis)" compartment="C_c">
    <notes>
        <html                                xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C81H156O17P2</p></html>
        </notes>

```

```

</species>
  <species id="M_cpd15794_c" name="Isoheptadecanoylcardiolipin (B. subtilis)"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C77H148O17P2</p></html>
    </notes>
</species>
  <species id="M_cpd15795_c" name="Anteisoheptadecanoylcardiolipin (B. subtilis)"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C77H148O17P2</p></html>
    </notes>
</species>
  <species id="M_cpd15796_c" name="Isotetradecanoylcardiolipin (B. subtilis)"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C65H124O17P2</p></html>
    </notes>
</species>
  <species id="M_cpd15797_c" name="Isopentadecanoylcardiolipin (B. subtilis)"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C69H132O17P2</p></html>
    </notes>
</species>
  <species id="M_cpd15798_c" name="Anteisopentadecanoylcardiolipin (B. subtilis)"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C69H132O17P2</p></html>
    </notes>
</species>
  <species id="M_cpd15799_c" name="Isohexadecanoylcardiolipin (B. subtilis)"
compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA:
C73H140O17P2</p></html>
    </notes>
</species>
  <species id="M_cpd15800_c" name="Lipid composition of B. subtilis" compartment="C_c">

```

```

    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: </p></html>
    </notes>
  </species>
  <species id="M_cpd16488_c" name="Generic lipid content" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C20H28O</p></html>
    </notes>
  </species>
  <species id="M_cpd16500_c" name="meso-2,3-butanediol" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H10O2</p></html>
    </notes>
  </species>
  <species id="M_cpd16500_e" name="meso-2,3-butanediol,extracellular"
compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C4H10O2</p></html>
    </notes>
  </species>
  <species id="M_C19891_c" name="D-chiro-Inositol" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O6</p></html>
    </notes>
  </species>
  <species id="M_C19891_e" name="D-chiro-Inositol,extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O6</p></html>
    </notes>
  </species>
  <species id="M_C06153_c" name="Scyllo-inositol" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O6</p></html>
    </notes>
  </species>
  <species id="M_C06153_e" name="Scyllo-inositol,extracellular" compartment="C_e">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H12O6</p></html>
    </notes>
  </species>
  <species id="M_TC0001_c" name="1-keto-D-chiro-inositol" compartment="C_c">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml"><p>FORMULA: C6H10O6</p></html>
    </notes>
  </species>

```

```

</species>
</listOfSpecies>
<listOfReactions>
  <reaction id="R_E00001" name="Exchange">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: </p>
        <p>GENE_LIST: </p>
        <p>SUBSYSTEM: Exchange</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00001_e"/>
    </listOfReactants>
    <listOfProducts>
    </listOfProducts>
    <kineticLaw>
      <math xmlns="http://www.w3.org/1998/Math/MathML">
        <ci> FLUX_VALUE </ci>
      </math>
      <listOfParameters>
        <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
      </listOfParameters>
    </kineticLaw>
  </reaction>
  <reaction id="R_E00002" name="Exchange">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: </p>
        <p>GENE_LIST: </p>
        <p>SUBSYSTEM: Exchange</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00007_e"/>
    </listOfReactants>
    <listOfProducts>
    </listOfProducts>
    <kineticLaw>
      <math xmlns="http://www.w3.org/1998/Math/MathML">
        <ci> FLUX_VALUE </ci>
      </math>

```



```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00003" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00009_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-5" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00004" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00011_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00005" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00013_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00006" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00014_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-5" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00007" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00020_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00008" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00022_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00009" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00025_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00010" name="Exchange">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00026_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00011" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00032_e"/>
  </listOfReactants>
  <listOfProducts>
</listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00012" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00033_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00013" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00034_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00014" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00037_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00015" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00038_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00016" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00041_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00017" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```



```

    <speciesReference species="M_C00042_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00018" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00047_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00019" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00048_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00020" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00049_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00021" name="Exchange">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00055_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00022" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00058_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00023" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00059_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-5" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00024" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00062_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00025" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00064_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00026" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00065_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00027" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00070_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00028" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00073_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00029" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00074_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00030" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00076_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00031" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00077_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00032" name="Exchange">

```



```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00078_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00033" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
  </listOfReactants>
  <listOfProducts>
</listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00034" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00082_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00035" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00086_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00036" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00088_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00037" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00089_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00038" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00093_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00039" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00095_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00040" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00097_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00041" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00099_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00042" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00103_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00043" name="Exchange">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00105_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00044" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00106_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00045" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00114_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00046" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00116_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```



```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00047" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00120_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00048" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00121_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00049" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00122_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00050" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00123_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00051" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00124_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00052" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00133_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00053" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00135_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00054" name="Exchange">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00137_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00055" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00140_e"/>
  </listOfReactants>
  <listOfProducts>
</listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00056" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00144_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00057" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00147_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00058" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00148_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00059" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00149_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00060" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00152_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00061" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```



```

    <speciesReference species="M_C00158_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00062" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00159_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00063" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00160_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00064" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00163_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00065" name="Exchange">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00164_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00066" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00169_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00067" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00175_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00068" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00181_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00069" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00182_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00070" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00183_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00071" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00184_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00072" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00185_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00073" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00186_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00074" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00188_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00075" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00189_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00076" name="Exchange">

```



```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00191_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00077" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00197_e"/>
  </listOfReactants>
  <listOfProducts>
</listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00078" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00204_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00079" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00208_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00080" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00212_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00081" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00214_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00082" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00216_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00083" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00217_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00084" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00238_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00085" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00242_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00086" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00243_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00087" name="Exchange">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00244_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00088" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00245_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00089" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00247_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00090" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00251_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```



```

    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-5" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00091" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00253_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00092" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00255_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00093" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00257_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00094" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00259_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00095" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00262_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00096" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00267_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-5" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00097" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00270_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00098" name="Exchange">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00275_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00099" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00283_e"/>
  </listOfReactants>
  <listOfProducts>
</listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00100" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00291_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00101" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00294_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00102" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00299_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00103" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00305_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00104" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00327_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00105" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```



```

    <speciesReference species="M_C00329_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00106" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00333_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00107" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00334_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00108" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00345_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00109" name="Exchange">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00346_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00110" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00352_e"/>
  </listOfReactants>
  <listOfProducts>
</listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00111" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00364_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00112" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00366_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00113" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00378_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00114" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00380_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00115" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00385_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00116" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00387_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00117" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00392_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00118" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00407_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00119" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00469_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00120" name="Exchange">

```



```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00475_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00121" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00487_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00122" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00491_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00123" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00492_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00124" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00497_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00125" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00504_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00126" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00506_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00127" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00507_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00128" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00530_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00129" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00532_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00130" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00536_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00131" name="Exchange">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00541_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00132" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00552_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00133" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00559_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00134" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00588_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```



```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00135" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00601_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00136" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00631_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00137" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00636_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00138" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00645_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00139" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00668_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00140" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00703_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00141" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00719_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00142" name="Exchange">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00721_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00143" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00725_e"/>
  </listOfReactants>
  <listOfProducts>
</listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00144" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00740_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00145" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00794_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00146" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00818_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00147" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00855_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00148" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00864_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00149" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```



```

    <speciesReference species="M_C00879_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00150" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00881_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00151" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00919_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00152" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00946_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00153" name="Exchange">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00988_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00154" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01005_e"/>
  </listOfReactants>
  <listOfProducts>
</listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00155" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01019_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00156" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01040_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00157" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01081_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00158" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01083_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00159" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01181_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00160" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C01330_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00161" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01367_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00162" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C01368_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00163" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01413_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00164" name="Exchange">

```



```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C01419_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00165" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01451_e"/>
  </listOfReactants>
  <listOfProducts>
</listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00166" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01487_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00167" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01610_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00168" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01697_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00169" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01722_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00170" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01742_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00171" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C01762_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00172" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01801_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00173" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C01835_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00174" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01879_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00175" name="Exchange">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C02086_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00176" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C02323_e"/>
  </listOfReactants>
  <listOfProducts>
</listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00177" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C02350_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00178" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C02353_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```



```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00179" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C02354_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00180" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C02355_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00181" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C02466_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00182" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C02532_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00183" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C03031_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00184" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C03044_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00185" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C03089_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00186" name="Exchange">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C03104_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00187" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C03570_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00188" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C03619_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00189" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C05123_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00190" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C05332_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00191" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C05345_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00192" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C05402_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00193" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```



```

    <speciesReference species="M_C05776_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00194" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C05822_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00195" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C05945_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00196" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C06186_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00197" name="Exchange">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C06193_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00198" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C06228_e"/>
  </listOfReactants>
  <listOfProducts>
</listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00199" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C06231_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00200" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C06232_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00201" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C06369_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00202" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C06468_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00203" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C06696_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00204" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C06697_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00205" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C07597_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00206" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C08240_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00207" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C08275_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00208" name="Exchange">

```



```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C08325_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00209" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C10172_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00210" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C11145_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00211" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C11458_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00212" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C11459_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00213" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C11546_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00214" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C12147_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00215" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C14179_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00216" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C14818_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00217" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C14819_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00218" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd01048_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00219" name="Exchange">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_cpd11575_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00220" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11577_e"/>
  </listOfReactants>
  <listOfProducts>
</listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00221" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11578_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00222" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11579_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```



```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00223" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11580_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00224" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11581_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00225" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11582_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00226" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_cpd11583_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00227" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11584_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00228" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_cpd11585_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00229" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11586_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00230" name="Exchange">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_cpd11587_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00231" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11588_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00232" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11589_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00233" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11590_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00234" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11591_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00235" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11592_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00236" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11593_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00237" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>

```



```

    <speciesReference species="M_cpd11595_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00238" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11596_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00239" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_cpd11597_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00240" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11598_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00241" name="Exchange">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Exchange</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_cpd11599_e"/>
</listOfReactants>
<listOfProducts>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00242" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd15471_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00243" name="Exchange">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd15585_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00004" name="Manganese-dependent inorganic pyrophosphatase (EC
3.6.1.1);Inorganic pyrophosphatase PpaX(BSU34970)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU40550 or BSU34970 )</p>
      <p>GENE_LIST: BSU40550 BSU34970</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00001_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c" stoichiometry="2"/>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00005" name="Allophanate hydrolase subunit 1 (EC 3.5.1.54)|Allophanate
hydrolase subunit 2 (EC 3.5.1.54)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU04080</p>
      <p>GENE_LIST: BSU04080</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="3"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01010_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c" stoichiometry="2"/>
    <speciesReference species="M_C00014_c" stoichiometry="2"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00009" name="Catalase (EC 1.11.1.6)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU38630 or BSU39050 or BSU08820 )</p>

```

```

    <p>GENE_LIST: BSU38630 BSU39050 BSU08820</p>
    <p>SUBSYSTEM: Carbohydrates</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00027_c" stoichiometry="2"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00007_c"/>
  <speciesReference species="M_C00001_c" stoichiometry="2"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00014" name="Pyruvate dehydrogenase E1 component alpha subunit (EC
1.2.4.1);Pyruvate dehydrogenase E1 component beta subunit (EC
1.2.4.1)(BSU14590);Acetolactate synthase small subunit (EC 2.2.1.6)(BSU28300);Acetolactate
synthase large subunit (EC 2.2.1.6)(BSU28310);Acetolactate synthase, catabolic (EC
2.2.1.6)(BSU36010)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU14580 and BSU14590 ) or ( BSU28300 and
BSU28310 ) or BSU36010 )</p>
      <p>GENE_LIST: BSU14580 BSU14590 BSU28300 BSU28310 BSU36010</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00022_c"/>
    <speciesReference species="M_C00068_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C05125_c"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00021" name="Ferredoxin-dependent glutamate synthase (EC 1.4.7.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU06590</p>
      <p>GENE_LIST: BSU06590</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00025_c" stoichiometry="2"/>
    <speciesReference species="M_C00139_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00064_c"/>
    <speciesReference species="M_C00026_c"/>
    <speciesReference species="M_C00138_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00022" name="Beta-hexosaminidase (EC 3.2.1.52)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU01660</p>

```

<p>GENE\_LIST: BSU01660</p>  
 <p>SUBSYSTEM: Carbohydrates</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00001\_c"/>  
 <speciesReference species="M\_C01674\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00140\_c" stoichiometry="2"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_R00026" name="Beta-glucosidase (EC 3.2.1.21);6-phospho-beta-glucosidase (EC 3.2.1.86)|Beta-glucosidase (EC 3.2.1.21)(BSU03410);6-phospho-beta-glucosidase (EC 3.2.1.86)|Beta-glucosidase (EC 3.2.1.21)(BSU39260)" reversible="false">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: ( BSU39260 or BSU03410 or BSU05840 )</p>  
 <p>GENE\_LIST: BSU39260 BSU03410 BSU05840</p>  
 <p>SUBSYSTEM: Carbohydrates</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00001\_e"/>  
 <speciesReference species="M\_C00185\_e"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00221\_e" stoichiometry="2"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>



```

    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00028" name="Alpha-glucosidase (EC 3.2.1.20)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU31290</p>
      <p>GENE_LIST: BSU31290</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00208_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00267_c" stoichiometry="2"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00036" name="Porphobilinogen synthase (EC 4.2.1.24)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU28130</p>
      <p>GENE_LIST: BSU28130</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00430_c" stoichiometry="2"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00001_c" stoichiometry="2"/>
  <speciesReference species="M_C00931_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00066" name="Riboflavin synthase alpha chain (EC 2.5.1.9);riboflavin
biosynthesis(BSU23240)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU23270 or BSU23240 )</p>
      <p>GENE_LIST: BSU23270 BSU23240</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C04332_c" stoichiometry="2"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00255_c"/>
    <speciesReference species="M_C04732_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00084" name="Porphobilinogen deaminase (EC 2.5.1.61)"

```

```

reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU28150</p>
      <p>GENE_LIST: BSU28150</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00931_c" stoichiometry="4"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00014_c" stoichiometry="4"/>
    <speciesReference species="M_C01024_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00086" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="5.85" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="5.85" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00089" name="Adenylate cyclase" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU11580</p>
      <p>GENE_LIST: BSU11580</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00575_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00104" name="NAD kinase (EC 2.7.1.23);Probable inorganic
polyphosphate/ATP-NAD kinase 2 (Poly(P)/ATP NAD kinase 2) (EC 2.7.1.23)(BSU29540)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU11610 or BSU29540 )</p>
      <p>GENE_LIST: BSU11610 BSU29540</p>
    </html>
  </notes>

```

<p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>  
</html>  
</notes>  
<listOfReactants>  
<speciesReference species="M\_C00002\_c"/>  
<speciesReference species="M\_C00003\_c"/>  
</listOfReactants>  
<listOfProducts>  
<speciesReference species="M\_C00008\_c"/>  
<speciesReference species="M\_C00006\_c"/>  
</listOfProducts>  
<kineticLaw>  
<math xmlns="http://www.w3.org/1998/Math/MathML">  
<ci> FLUX\_VALUE </ci>  
</math>  
<listOfParameters>  
<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
</listOfParameters>  
</kineticLaw>  
</reaction>  
<reaction id="R\_R00114" name="Glutamate synthase [NADPH] small chain (EC 1.4.1.13);Glutamate synthase [NADPH] large chain (EC 1.4.1.13)(BSU18450)" reversible="false">  
<notes>  
<html xmlns="http://www.w3.org/1999/xhtml">  
<p>GENE\_ASSOCIATION: ( BSU18440 and BSU18450 )</p>  
<p>GENE\_LIST: BSU18440 BSU18450</p>  
<p>SUBSYSTEM: Amino Acids and Derivatives</p>  
</html>  
</notes>  
<listOfReactants>  
<speciesReference species="M\_C00080\_c"/>  
<speciesReference species="M\_C00005\_c"/>  
<speciesReference species="M\_C00064\_c"/>  
<speciesReference species="M\_C00026\_c"/>  
</listOfReactants>  
<listOfProducts>  
<speciesReference species="M\_C00006\_c"/>  
<speciesReference species="M\_C00025\_c" stoichiometry="2"/>  
</listOfProducts>  
<kineticLaw>  
<math xmlns="http://www.w3.org/1998/Math/MathML">

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00127" name="Adenylate kinase (EC 2.7.4.3)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU01370</p>
      <p>GENE_LIST: BSU01370</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00020_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c" stoichiometry="2"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00130" name="Dephospho-CoA kinase (EC 2.7.1.24)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU29060</p>
      <p>GENE_LIST: BSU29060</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00882_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00010_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00131" name="Urease alpha subunit (EC 3.5.1.5);Urease beta subunit (EC
3.5.1.5)(BSU36650);Urease gamma subunit (EC 3.5.1.5)(BSU36660)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU36640 and BSU36650 and BSU36660 )</p>
      <p>GENE_LIST: BSU36640 BSU36650 BSU36660</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00086_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00014_c" stoichiometry="2"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00132" name="Carbonic anhydrase (EC 4.2.1.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU30690 or BSU34670 )</p>
      <p>GENE_LIST: BSU30690 BSU34670</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00288_c"/>
    <speciesReference species="M_C00080_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00011_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00137" name="Nicotinate-nucleotide adenylyltransferase (EC 2.7.7.18)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25640</p>
      <p>GENE_LIST: BSU25640</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00455_c"/>
  </listOfReactants>
  <listOfProducts>

```



```

    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00013_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00156" name="Nucleoside diphosphate kinase (EC 2.7.4.6)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22730</p>
      <p>GENE_LIST: BSU22730</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00015_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00075_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00158" name="Uridylate kinase (EC 2.7.4.-)" reversible="false">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: BSU16510</p>
  <p>GENE_LIST: BSU16510</p>
  <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00105_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00015_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00161" name="FMN adenylyltransferase (EC 2.7.7.2)|Riboflavin kinase
(EC 2.7.1.26)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16670</p>
      <p>GENE_LIST: BSU16670</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00061_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00016_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00177" name="S-adenosylmethionine synthetase (EC 2.5.1.6)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30550</p>
      <p>GENE_LIST: BSU30550</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00073_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00019_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00178" name="S-adenosylmethionine decarboxylase proenzyme (EC
4.1.1.50), prokaryotic class 1B" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU29010</p>

```

<p>GENE\_LIST: BSU29010</p>  
 <p>SUBSYSTEM: Amino Acids and Derivatives</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00019\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00011\_c"/>  
 <speciesReference species="M\_C01137\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_R00183" name="5'-nucleotidase yjjG (EC 3.1.3.5);2',3'-cyclic-nucleotide 2'-phosphodiesterase (EC 3.1.4.16)|5'-nucleotidase (EC 3.1.3.5)(BSU07840)" reversible="false">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: ( BSU07840 or BSU07330 )</p>  
 <p>GENE\_LIST: BSU07840 BSU07330</p>  
 <p>SUBSYSTEM: Nucleosides and Nucleotides</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00020\_c"/>  
 <speciesReference species="M\_C00001\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00009\_c"/>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00212\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00188" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00054_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00020_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00189" name="NAD synthetase (EC 6.3.1.5)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU03130</p>
      <p>GENE_LIST: BSU03130</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00014_c"/>
  <speciesReference species="M_C00857_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C00013_c"/>
  <speciesReference species="M_C00020_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00190" name="Adenine phosphoribosyltransferase (EC 2.4.2.7)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27610</p>
      <p>GENE_LIST: BSU27610</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00147_c"/>
    <speciesReference species="M_C00119_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00192" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00021_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00155_c"/>
    <speciesReference species="M_C00212_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00194" name="5'-methylthioadenosine nucleosidase (EC
3.2.2.16)|S-adenosylhomocysteine nucleosidase (EC 3.2.2.9)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27270</p>
      <p>GENE_LIST: BSU27270</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00021_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00147_c"/>
  <speciesReference species="M_C03539_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00199" name="Phosphoenolpyruvate synthase (EC 2.7.9.2)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU18830</p>
      <p>GENE_LIST: BSU18830</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00022_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00074_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```



```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00200" name="Pyruvate kinase (EC 2.7.1.40)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU29180</p>
      <p>GENE_LIST: BSU29180</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00074_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00022_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00207" name="Pyruvate oxidase [ubiquinone, cytochrome] (EC 1.2.2.2)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU04340</p>
      <p>GENE_LIST: BSU04340</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C00022_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00227_c"/>
  <speciesReference species="M_C00011_c"/>
  <speciesReference species="M_C00027_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00214" name="NAD-dependent malic enzyme (EC 1.1.1.38);Malolactic
enzyme (EC 1.-.-.-)(BSU23550)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU23550 or BSU29880 or BSU37050 )</p>
      <p>GENE_LIST: BSU23550 BSU29880 BSU37050</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00149_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00022_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </kineticLaw>
  </reaction>
  <reaction id="R_R00215" name="D-malic enzyme (EC 1.1.1.83)|Tartrate decarboxylase (EC
4.1.1.73)|Tartrate dehydrogenase (EC 1.1.1.93)" reversible="false">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU04000</p>
        <p>GENE_LIST: BSU04000</p>
        <p>SUBSYSTEM: Carbohydrates</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00003_c"/>
      <speciesReference species="M_C00497_c"/>
    </listOfReactants>
    <listOfProducts>
      <speciesReference species="M_C00004_c"/>
      <speciesReference species="M_C00011_c"/>
      <speciesReference species="M_C00022_c"/>
    </listOfProducts>
    <kineticLaw>
      <math xmlns="http://www.w3.org/1998/Math/MathML">
        <ci> FLUX_VALUE </ci>
      </math>
      <listOfParameters>
        <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
        <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
      </listOfParameters>
    </kineticLaw>
  </reaction>
  <reaction id="R_R00216" name="NADP-dependent malic enzyme (EC 1.1.1.40)"
reversible="false">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU29220</p>
        <p>GENE_LIST: BSU29220</p>
        <p>SUBSYSTEM: Carbohydrates</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00006_c"/>
      <speciesReference species="M_C00149_c"/>
    </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00005_c"/>
  <speciesReference species="M_C00011_c"/>
  <speciesReference species="M_C00022_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00220" name="L-serine dehydratase, beta subunit (EC 4.3.1.17);L-serine
dehydratase, alpha subunit (EC 4.3.1.17)(BSU15860)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15850 and BSU15860 )</p>
      <p>GENE_LIST: BSU15850 BSU15860</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00065_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00022_c"/>
    <speciesReference species="M_C00014_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00221" name="D-serine dehydratase (EC 4.3.1.18)" reversible="false">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: BSU23770</p>
    <p>GENE_LIST: BSU23770</p>
    <p>SUBSYSTEM: Amino Acids and Derivatives</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00740_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00022_c"/>
  <speciesReference species="M_C00014_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00230" name="Phosphate acetyltransferase (EC 2.3.1.8)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37660</p>
      <p>GENE_LIST: BSU37660</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00024_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00227_c"/>
    <speciesReference species="M_C00010_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00235" name="Acetyl-coenzyme A synthetase (EC 6.2.1.1)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU29560 or BSU29680 )</p>
      <p>GENE_LIST: BSU29560 BSU29680</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00033_c"/>
    <speciesReference species="M_C00010_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00238" name="3-ketoacyl-CoA thiolase (EC 2.3.1.16)|Acetyl-CoA
acetyltransferase (EC 2.3.1.9);3-ketoacyl-CoA thiolase [isoleucine degradation] (EC
2.3.1.16)(BSU24170)">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: ( BSU10350 or BSU24170 or BSU32830 )</p>
  <p>GENE_LIST: BSU10350 BSU24170 BSU32830</p>
  <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00024_c" stoichiometry="2"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00010_c"/>
  <speciesReference species="M_C00332_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00239" name="Glutamate 5-kinase (EC 2.7.2.11)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU13120 or BSU18470 )</p>
      <p>GENE_LIST: BSU13120 BSU18470</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00025_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C03287_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00243" name="NAD-specific glutamate dehydrogenase (EC 1.4.1.2)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU22960 or BSU37790 )</p>
      <p>GENE_LIST: BSU22960 BSU37790</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00025_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C00026_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00245" name="Delta-1-pyrroline-5-carboxylate dehydrogenase (EC
1.5.1.12)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU37780 or BSU03210 )</p>
      <p>GENE_LIST: BSU37780 BSU03210</p>

```



```

    <p>SUBSYSTEM: Amino Acids and Derivatives</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C01165_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c" stoichiometry="2"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_C00025_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00253" name="Glutamine synthetase type I (EC 6.3.1.2)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU17460</p>
      <p>GENE_LIST: BSU17460</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C00014_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00064_c"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00256" name="Glutaminase (EC 3.5.1.2)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU14830 or BSU02430 )</p>
      <p>GENE_LIST: BSU14830 BSU02430</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00064_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C00014_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00258" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>

```

```

    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00026_c"/>
    <speciesReference species="M_C00041_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C00022_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00259" name="Glutamate N-acetyltransferase (EC
2.3.1.35)|N-acetylglutamate synthase (EC 2.3.1.1)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU11200</p>
      <p>GENE_LIST: BSU11200</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C00025_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C00624_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00260" name="Glutamate racemase (EC 5.1.1.3);Glutamate racemase 2
(EC 5.1.1.3)(BSU26810)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU28390 or BSU26810 )</p>
      <p>GENE_LIST: BSU28390 BSU26810</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00025_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00217_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00264" name="Ketoglutarate semialdehyde dehydrogenase (EC 1.2.1.26)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02470</p>
      <p>GENE_LIST: BSU02470</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00433_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c" stoichiometry="2"/>
  <speciesReference species="M_C00005_c"/>
  <speciesReference species="M_C00026_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00268" name="Isocitrate dehydrogenase [NADP] (EC 1.1.1.42)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU29130</p>
      <p>GENE_LIST: BSU29130</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C05379_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00026_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_R00272"
name="2-succinyl-5-enolpyruvyl-6-hydroxy-3-cyclohexene-1-carboxylic-acid synthase (EC
2.2.1.9)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30820</p>
      <p>GENE_LIST: BSU30820</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00026_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00232_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00274" name="Glutathione peroxidase family protein" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU21900</p>
      <p>GENE_LIST: BSU21900</p>
      <p>SUBSYSTEM: Sulfur Metabolism</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00027_c"/>
    <speciesReference species="M_C00051_c" stoichiometry="2"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c" stoichiometry="2"/>
  </listOfProducts>

```

```

    <speciesReference species="M_C00127_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00275" name="Superoxide dismutase [Fe] (EC 1.15.1.1);Manganese
superoxide dismutase (EC 1.15.1.1)(BSU25020);Superoxide dismutase [Cu-Zn] (EC
1.15.1.1)(BSU19400)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU19330 or BSU19400 or BSU25020 )</p>
      <p>GENE_LIST: BSU19330 BSU19400 BSU25020</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00704_c" stoichiometry="2"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C00027_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00286" name="UDP-glucose dehydrogenase (EC 1.1.1.22)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

<p>GENE\_ASSOCIATION: ( BSU35580 or BSU30860 or BSU36230 )</p>  
 <p>GENE\_LIST: BSU35580 BSU30860 BSU36230</p>  
 <p>SUBSYSTEM: Carbohydrates</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00003\_c" stoichiometry="2"/>  
 <speciesReference species="M\_C00001\_c"/>  
 <speciesReference species="M\_C00029\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00080\_c" stoichiometry="3"/>  
 <speciesReference species="M\_C00004\_c" stoichiometry="2"/>  
 <speciesReference species="M\_C00167\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_R00287" name="5'-nucleotidase (EC 3.1.3.5)|UDP-sugar hydrolase (EC 3.6.1.45)" reversible="false">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: BSU32370</p>  
 <p>GENE\_LIST: BSU32370</p>  
 <p>SUBSYSTEM: Nucleosides and Nucleotides</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00001\_c"/>  
 <speciesReference species="M\_C00029\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00105\_c"/>  
 <speciesReference species="M\_C00103\_c"/>  
 </listOfProducts>  
 <kineticLaw>



```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00289" name="UTP--glucose-1-phosphate uridylyltransferase (EC
2.7.7.9)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU18180 or BSU30850 or Bsu3567 or BSU35670 )</p>
      <p>GENE_LIST: BSU18180 BSU30850 BSU35670</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00103_c"/>
    <speciesReference species="M_C00075_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00029_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00291" name="UDP-glucose 4-epimerase (EC 5.1.3.2)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU38860</p>
      <p>GENE_LIST: BSU38860</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>

```

```

    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00052_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00293" name="UDP-N-acetylglucosamine 4,6-dehydratase (EC 4.2.1.-)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU19810</p>
      <p>GENE_LIST: BSU19810</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C04089_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>

```

```

</kineticLaw>
</reaction>
<reaction id="R_R00310" name="Ferrochelatase, protoheme ferro-lyase (EC 4.99.1.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU10130</p>
      <p>GENE_LIST: BSU10130</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C14818_c"/>
    <speciesReference species="M_C02191_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00032_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00315" name="Acetate kinase (EC 2.7.2.1)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU29470</p>
      <p>GENE_LIST: BSU29470</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00033_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>

```

```

    <speciesReference species="M_C00227_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00317" name="Acylphosphate phosphohydrolase (EC 3.6.1.7), putative"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU07640</p>
      <p>GENE_LIST: BSU07640</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00227_c"/>
    <speciesReference species="M_C00001_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00033_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00321" name="Aliphatic amidase amiE (EC 3.5.1.4)" reversible="false">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: BSU13570</p>
  <p>GENE_LIST: BSU13570</p>
  <p>SUBSYSTEM: Amino Acids and Derivatives</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C06244_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00033_c"/>
  <speciesReference species="M_C00014_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00330" name="Nucleoside diphosphate kinase (EC 2.7.4.6)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22730</p>
      <p>GENE_LIST: BSU22730</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00035_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00044_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00332" name="Guanylate kinase (EC 2.7.4.8)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15680</p>
      <p>GENE_LIST: BSU15680</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00144_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00035_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00341" name="Phosphoenolpyruvate carboxykinase [ATP] (EC 4.1.1.49)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30560</p>
      <p>GENE_LIST: BSU30560</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00036_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00011_c"/>
  <speciesReference species="M_C00074_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00342" name="Malate dehydrogenase (EC 1.1.1.37);(R)-2-hydroxyacid
dehydrogenase, similar to L-sulfolactate dehydrogenase (EC 1.1.1.272)(BSU12320)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU12320 or BSU29120 )</p>
      <p>GENE_LIST: BSU12320 BSU29120</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00149_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00036_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00344" name="Pyruvate carboxyl transferase (EC 6.4.1.1)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU14860</p>
      <p>GENE_LIST: BSU14860</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00288_c"/>
    <speciesReference species="M_C00022_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00036_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00351" name="Citrate synthase (si) (EC 2.3.3.1)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU29140 or BSU09440 )</p>
      <p>GENE_LIST: BSU29140 BSU09440</p>
      <p>SUBSYSTEM: Carbohydrates</p>

```



```

    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00036_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C00158_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00355" name="Aspartate aminotransferase (EC
2.6.1.1);Aspartate/tyrosine/aromatic aminotransferase(BSU09570)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU22370 or BSU37690 or BSU09570 )</p>
      <p>GENE_LIST: BSU22370 BSU37690 BSU09570</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00026_c"/>
    <speciesReference species="M_C00049_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C00036_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00357" name="L-aspartate oxidase (EC 1.4.3.16)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27870</p>
      <p>GENE_LIST: BSU27870</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00049_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00007_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00036_c"/>
    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C00027_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00366" name="Glycine oxidase ThiO (EC 1.4.3.19)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU11670</p>
      <p>GENE_LIST: BSU11670</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00007_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00037_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00014_c"/>
  <speciesReference species="M_C00027_c"/>
  <speciesReference species="M_C00048_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00369" name="L-alanine:glyoxylate aminotransferase (EC
2.6.1.44)|Serine--pyruvate aminotransferase (EC 2.6.1.51)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32520</p>
      <p>GENE_LIST: BSU32520</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00048_c"/>
    <speciesReference species="M_C00041_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00022_c"/>
    <speciesReference species="M_C00037_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00371" name="2-amino-3-ketobutyrate coenzyme A ligase (EC 2.3.1.29)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU17000</p>
      <p>GENE_LIST: BSU17000</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C00037_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C03508_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00396" name="Alanine dehydrogenase (EC 1.4.1.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU31930</p>
      <p>GENE_LIST: BSU31930</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00041_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_C00022_c"/>
  <speciesReference species="M_C00014_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00401" name="Alanine racemase (EC 5.1.1.1);Alanine racemase 2 (EC
5.1.1.1)(BSU17640)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU04640 and BSU17640 ) or (BSU04640) )</p>
      <p>GENE_LIST: BSU04640 BSU17640</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00041_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00133_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

<reaction id="R\_R00405" name="Succinyl-CoA ligase [ADP-forming] beta chain (EC 6.2.1.5);Succinyl-CoA ligase [ADP-forming] alpha chain (EC 6.2.1.5)(BSU16100)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU16090 and BSU16100 )</p>

<p>GENE\_LIST: BSU16090 BSU16100</p>

<p>SUBSYSTEM: Carbohydrates</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00002\_c"/>

<speciesReference species="M\_C00010\_c"/>

<speciesReference species="M\_C00042\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00008\_c"/>

<speciesReference species="M\_C00009\_c"/>

<speciesReference species="M\_C00091\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_R00408" name="Succinate dehydrogenase iron-sulfur protein (EC 1.3.99.1);Succinate dehydrogenase flavoprotein subunit (EC 1.3.99.1)(BSU28440);Succinate dehydrogenase cytochrome b558 subunit(BSU28450)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU28430 and BSU28440 and BSU28450 )</p>

<p>GENE\_LIST: BSU28430 BSU28440 BSU28450</p>

<p>SUBSYSTEM: Carbohydrates</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00042\_c"/>

<speciesReference species="M\_C00016\_c"/>

</listOfReactants>

```

<listOfProducts>
  <speciesReference species="M_C00122_c"/>
  <speciesReference species="M_C01352_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00409" name="Methylisocitrate lyase (EC 4.1.3.30)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU24120</p>
      <p>GENE_LIST: BSU24120</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C04593_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00022_c"/>
    <speciesReference species="M_C00042_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00410" name="Butyrate-acetoacetate CoA-transferase subunit B (EC
2.8.3.9);Butyrate-acetoacetate CoA-transferase subunit A (EC 2.8.3.9)(BSU38990)">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: ( BSU38980 and BSU38990 )</p>
  <p>GENE_LIST: BSU38980 BSU38990</p>
  <p>SUBSYSTEM: Carbohydrates</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00091_c"/>
  <speciesReference species="M_C00164_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00332_c"/>
  <speciesReference species="M_C00042_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00414" name="UDP-N-acetylglucosamine 2-epimerase (EC 5.1.3.14)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35660</p>
      <p>GENE_LIST: BSU35660</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00043_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c"/>
    <speciesReference species="M_C00645_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </kineticLaw>
</reaction>

```



```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00416" name="Glucosamine-1-phosphate N-acetyltransferase (EC
2.3.1.157)|N-acetylglucosamine-1-phosphate uridyltransferase (EC 2.7.7.23)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00500</p>
      <p>GENE_LIST: BSU00500</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C04501_c"/>
    <speciesReference species="M_C00075_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00043_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00418" name="UDP-glucose 4-epimerase (EC 5.1.3.2);UDP-glucuronate
5'-epimerase (EC 5.1.3.12)(BSU30870)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU38860 or BSU30870 )</p>
      <p>GENE_LIST: BSU38860 BSU30870</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00043_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00203_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00420" name="UDP-N-acetylglucosamine 2-epimerase (EC 5.1.3.14)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35660</p>
      <p>GENE_LIST: BSU35660</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00043_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C01170_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00425" name="3,4-dihydroxy-2-butanone 4-phosphate synthase|GTP

```

```

cyclohydrolase II (EC 3.5.4.25)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU23260</p>
      <p>GENE_LIST: BSU23260</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c" stoichiometry="3"/>
    <speciesReference species="M_C00044_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00058_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C01304_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00428" name="GTP cyclohydrolase I (EC 3.5.4.16) type 1;GTP
cyclohydrolase I (EC 3.5.4.16) type 2(BSU03340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU22780 or BSU03340 )</p>
      <p>GENE_LIST: BSU22780 BSU03340</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00044_c"/>
    <speciesReference species="M_C00001_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C05922_c"/>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00429" name="GTP pyrophosphokinase (EC 2.7.6.5);GTP
pyrophosphokinase (EC 2.7.6.5), (p)ppGpp synthetase I(BSU27600)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU11600 or BSU27600 )</p>
      <p>GENE_LIST: BSU11600 BSU27600</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00044_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C04494_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00451" name="Diaminopimelate decarboxylase (EC 4.1.1.20)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

<p>GENE\_ASSOCIATION: BSU23380</p>  
 <p>GENE\_LIST: BSU23380</p>  
 <p>SUBSYSTEM: Amino Acids and Derivatives</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00680\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00011\_c"/>  
 <speciesReference species="M\_C00047\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_R00461" name="Lysine 2,3-aminomutase (EC 5.4.3.2)">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: BSU19690</p>  
 <p>GENE\_LIST: BSU19690</p>  
 <p>SUBSYSTEM: Amino Acids and Derivatives</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00047\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C01142\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00462" name="Arginine decarboxylase (EC 4.1.1.19)|Lysine decarboxylase
(EC 4.1.1.18);Lysine decarboxylase family(BSU34640)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU00270 or BSU34640 )</p>
      <p>GENE_LIST: BSU00270 BSU34640</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00047_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C01672_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00465" name="Glyoxylate reductase (EC 1.1.1.26)|Glyoxylate reductase
(EC 1.1.1.79)|Hydroxypyruvate reductase (EC 1.1.1.81)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU34680</p>
      <p>GENE_LIST: BSU34680</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>

```

```

    <speciesReference species="M_C00160_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C00048_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00469" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00603_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00014_c" stoichiometry="2"/>
    <speciesReference species="M_C00048_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00470" name="2-dehydro-3-deoxyphosphogluconate aldolase (EC
4.1.2.14)|4-Hydroxy-2-oxoglutarate aldolase (EC 4.1.3.16)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22100</p>
      <p>GENE_LIST: BSU22100</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C05946_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00022_c"/>
    <speciesReference species="M_C00048_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00475" name="Glycolate dehydrogenase (EC 1.1.99.14), subunit
GlcD;Similar to glycolate dehydrogenase iron-sulfur subunit GlcF(BSU28690)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU28680 and BSU28690 )</p>
      <p>GENE_LIST: BSU28680 BSU28690</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C00160_c"/>
  </listOfReactants>

```



```

<listOfProducts>
  <speciesReference species="M_C00027_c"/>
  <speciesReference species="M_C00048_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00480" name="Aspartokinase (EC 2.7.2.4)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU16760 or BSU28470 or BSU03790 )</p>
      <p>GENE_LIST: BSU16760 BSU28470 BSU03790</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00049_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C03082_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00481" name="L-aspartate oxidase (EC 1.4.3.16)" reversible="false">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: BSU27870</p>
    <p>GENE_LIST: BSU27870</p>
    <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00007_c"/>
  <speciesReference species="M_C00049_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00027_c"/>
  <speciesReference species="M_C05840_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00485" name="L-asparaginase (EC 3.5.1.1)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU23580 or BSU02690 )</p>
      <p>GENE_LIST: BSU23580 BSU02690</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00152_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C00049_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00489" name="Aspartate 1-decarboxylase (EC 4.1.1.11)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22410</p>
      <p>GENE_LIST: BSU22410</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00049_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00099_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00490" name="Aspartate ammonia-lyase (EC 4.3.1.1)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU23570</p>
      <p>GENE_LIST: BSU23570</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>

```

```

</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00049_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00122_c"/>
  <speciesReference species="M_C00014_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00494" name="Gamma-glutamyltranspeptidase (EC 2.3.2.2);Tripeptide
aminopeptidase (EC 3.4.11.4)(BSU38920);Peptidase T (EC 3.4.11.4)(BSU23910)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU18410 or BSU23910 or BSU38920 )</p>
      <p>GENE_LIST: BSU18410 BSU23910 BSU38920</p>
      <p>SUBSYSTEM: Sulfur Metabolism</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00051_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C01419_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00502" name="Galactose-1-phosphate uridylyltransferase (EC 2.7.7.10)">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: BSU38190</p>
            <p>GENE_LIST: BSU38190</p>
            <p>SUBSYSTEM: Carbohydrates</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00075_c"/>
        <speciesReference species="M_C00446_c"/>
    </listOfReactants>
    <listOfProducts>
        <speciesReference species="M_C00013_c"/>
        <speciesReference species="M_C00052_c"/>
    </listOfProducts>
    <kineticLaw>
        <math xmlns="http://www.w3.org/1998/Math/MathML">
            <ci> FLUX_VALUE </ci>
        </math>
        <listOfParameters>
            <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
            <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
            <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
        </listOfParameters>
    </kineticLaw>
</reaction>
<reaction id="R_R00509" name="Adenylylsulfate kinase (EC 2.7.1.25)" reversible="false">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: ( BSU10910 or BSU15600 )</p>
            <p>GENE_LIST: BSU10910 BSU15600</p>
            <p>SUBSYSTEM: Sulfur Metabolism</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00002_c"/>
        <speciesReference species="M_C00224_c"/>
    </listOfReactants>
    <listOfProducts>

```

```

    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00053_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00511" name="5'-nucleotidase yjjG (EC 3.1.3.5);2',3'-cyclic-nucleotide
2'-phosphodiesterase (EC 3.1.4.16)|5'-nucleotidase (EC 3.1.3.5)(BSU07840)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU07840 or BSU07330 )</p>
      <p>GENE_LIST: BSU07840 BSU07330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00055_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00475_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00512" name="Cytidylate kinase (EC 2.7.4.14)" reversible="false">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: BSU22890</p>
    <p>GENE_LIST: BSU22890</p>
    <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00055_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00112_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00513" name="Uridine kinase (EC 2.7.1.48) [C1]" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27330</p>
      <p>GENE_LIST: BSU27330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00475_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00055_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00516" name="Uridine kinase (EC 2.7.1.48) [C1]" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27330</p>
      <p>GENE_LIST: BSU27330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00475_c"/>
    <speciesReference species="M_C00075_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c"/>
    <speciesReference species="M_C00055_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00517" name="Uridine kinase (EC 2.7.1.48) [C1]" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27330</p>
      <p>GENE_LIST: BSU27330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>

```



```

<listOfReactants>
  <speciesReference species="M_C00044_c"/>
  <speciesReference species="M_C00475_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00055_c"/>
  <speciesReference species="M_C00035_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00519" name="Putative formate dehydrogenase yrhE (EC 1.2.1.2);formate
dehydrogenase, alpha subunit(BSU12160);formate dehydrogenase, alpha
subunit(BSU18570);Formate dehydrogenase chain D (EC 1.2.1.2)(BSU36710)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU27220 or BSU12160 or BSU18570 or
BSU36710 )</p>
      <p>GENE_LIST: BSU27220 BSU12160 BSU18570 BSU36710</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00058_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00011_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00522" name="Oxalate decarboxylase (EC 4.1.1.2)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU18670 or BSU33240 )</p>
      <p>GENE_LIST: BSU18670 BSU33240</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00209_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00058_c"/>
    <speciesReference species="M_C00011_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00525" name="Peptide deformylase (EC 3.5.1.88)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU14560 or BSU15720 )</p>
      <p>GENE_LIST: BSU14560 BSU15720</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01045_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00058_c"/>
  <speciesReference species="M_C00025_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00526" name="Peptide deformylase (EC 3.5.1.88)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU14560 or BSU15720 )</p>
      <p>GENE_LIST: BSU14560 BSU15720</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01044_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00058_c"/>
    <speciesReference species="M_C00049_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00529" name="Sulfate adenylyltransferase, dissimilatory-type (EC

```

2.7.7.4)" reversible="false">

```
<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: ( BSU10920 or BSU15590 )</p>
    <p>GENE_LIST: BSU10920 BSU15590</p>
    <p>SUBSYSTEM: Sulfur Metabolism</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00059_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00013_c"/>
  <speciesReference species="M_C00224_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00549" name="Riboflavin kinase (EC 2.7.1.26);FMN adenylyltransferase
(EC 2.7.7.2)Riboflavin kinase (EC 2.7.1.26)(BSU16670)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU16670 or BSU29300 )</p>
      <p>GENE_LIST: BSU16670 BSU29300</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00255_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00061_c"/>
```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00551" name="Arginase (EC 3.5.3.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU40320</p>
      <p>GENE_LIST: BSU40320</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00062_c"/>
    <speciesReference species="M_C00001_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00077_c"/>
    <speciesReference species="M_C00086_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00554" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
    </html>
  </notes>

```

```

    <p>SUBSYSTEM: Amino Acids and Derivatives</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00062_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C05945_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00566" name="Arginine decarboxylase (EC 4.1.1.19);Arginine
decarboxylase (EC 4.1.1.19)|Lysine decarboxylase (EC 4.1.1.18)(BSU00270)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU14630 or BSU00270 )</p>
      <p>GENE_LIST: BSU14630 BSU00270</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00062_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00179_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00570" name="Nucleoside diphosphate kinase (EC 2.7.4.6)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22730</p>
      <p>GENE_LIST: BSU22730</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00112_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00063_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00571" name="CTP synthase (EC 6.3.4.2)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37150</p>
      <p>GENE_LIST: BSU37150</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C00075_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00063_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00573" name="CTP synthase (EC 6.3.4.2)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37150</p>
      <p>GENE_LIST: BSU37150</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00064_c"/>
    <speciesReference species="M_C00075_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C00063_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```



```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00575" name="Carbamoyl-phosphate synthase small chain (EC
6.3.5.5);Carbamoyl-phosphate synthase large chain (EC
6.3.5.5)(BSU11240);Carbamoyl-phosphate synthase large chain (EC 6.3.5.5)(BSU15520)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU11230 and BSU11240 ) or ( BSU15510 and
BSU15520 ) )</p>
      <p>GENE_LIST: BSU11230 BSU11240 BSU15510 BSU15520</p>
      <p>SUBSYSTEM: Macromolecular Synthesis</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c" stoichiometry="2"/>
    <speciesReference species="M_C00288_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00064_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c" stoichiometry="2"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C00169_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_R00578" name="Asparagine synthetase [glutamine-hydrolyzing] (EC
6.3.5.4)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU10790 or BSU30540 or BSU39920 )</p>
      <p>GENE_LIST: BSU10790 BSU30540 BSU39920</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00064_c"/>
    <speciesReference species="M_C00049_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C00152_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00582" name="Phosphoserine phosphatase rsbX (EC 3.1.3.3)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU04740</p>
      <p>GENE_LIST: BSU04740</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>

```

```

    <speciesReference species="M_C01005_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00065_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00585" name="L-alanine:glyoxylate aminotransferase (EC
2.6.1.44)|Serine--pyruvate aminotransferase (EC 2.6.1.51)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32520</p>
      <p>GENE_LIST: BSU32520</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00022_c"/>
    <speciesReference species="M_C00065_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00168_c"/>
    <speciesReference species="M_C00041_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>

```

```

</kineticLaw>
</reaction>
<reaction id="R_R00586" name="Serine acetyltransferase (EC 2.3.1.30)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00930</p>
      <p>GENE_LIST: BSU00930</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C00065_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C00979_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00605" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00132_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
  </listOfProducts>

```

```

    <speciesReference species="M_C00067_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00617" name="Thiamine-monophosphate kinase (EC 2.7.4.16)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU05900</p>
      <p>GENE_LIST: BSU05900</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C01081_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00068_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00619" name="Thiamin pyrophosphokinase (EC 2.7.6.2)"
reversible="false">
  <notes>

```

```

    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15800</p>
      <p>GENE_LIST: BSU15800</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00378_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00068_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00621" name="2-oxoglutarate dehydrogenase E1 component (EC 1.2.4.2)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU19370</p>
      <p>GENE_LIST: BSU19370</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00068_c"/>
    <speciesReference species="M_C00026_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C05381_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00650" name="Homocysteine S-methyltransferase (EC 2.1.1.10)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02410</p>
      <p>GENE_LIST: BSU02410</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00155_c"/>
    <speciesReference species="M_C00019_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00073_c"/>
    <speciesReference species="M_C00021_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00653" name="Peptide deformylase (EC 3.5.1.88)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15720 or BSU14560 )</p>
      <p>GENE_LIST: BSU15720 BSU14560</p>
    </html>
  </notes>

```

```

    <p>SUBSYSTEM: Carbohydrates</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C03145_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00058_c"/>
  <speciesReference species="M_C00073_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00658" name="Enolase (EC 4.2.1.11)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU33900</p>
      <p>GENE_LIST: BSU33900</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00631_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00074_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```



```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00660" name="UDP-N-acetylglucosamine 1-carboxyvinyltransferase (EC
2.5.1.7);UDP-N-acetylglucosamine 1-carboxyvinyltransferase 2 (EC 2.5.1.7) (Enoylpyruvate
transferase 2) (UDP-N-acetylglucosamine enolpyruvyl transferase 2) (EPT 2)(BSU37100)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU36760 or BSU37100 )</p>
      <p>GENE_LIST: BSU36760 BSU37100</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00043_c"/>
    <speciesReference species="M_C00074_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C04631_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00667" name="Ornithine aminotransferase (EC 2.6.1.13)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU40340</p>
      <p>GENE_LIST: BSU40340</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00026_c"/>

```

```

    <speciesReference species="M_C00077_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C01165_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00669" name="Acetylornithine deacetylase (EC 3.5.1.16);N-acyl-L-amino
acid amidohydrolase (EC 3.5.1.14)(BSU10070)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU19710 or BSU15350 or BSU10070 )</p>
      <p>GENE_LIST: BSU19710 BSU15350 BSU10070</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00437_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00033_c"/>
    <speciesReference species="M_C00077_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_R00674" name="Tryptophan synthase alpha chain (EC 4.2.1.20);Tryptophan
synthase beta chain (EC 4.2.1.20)(BSU22640)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU22630 and BSU22640 )</p>
      <p>GENE_LIST: BSU22630 BSU22640</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00065_c"/>
    <speciesReference species="M_C00463_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00078_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00691" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00826_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00011_c"/>
  </listOfProducts>

```

```

    <speciesReference species="M_C00079_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00694" name="Aspartate/tyrosine/aromatic aminotransferase;Biosynthetic
Aromatic amino acid aminotransferase beta (EC 2.6.1.57)|Histidinol-phosphate aminotransferase
(EC 2.6.1.9)(BSU22620)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU22620 or BSU09570 )</p>
      <p>GENE_LIST: BSU22620 BSU09570</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00026_c"/>
    <speciesReference species="M_C00079_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C00166_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00703" name="L-lactate dehydrogenase (EC 1.1.1.27)">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: BSU03050</p>
  <p>GENE_LIST: BSU03050</p>
  <p>SUBSYSTEM: Carbohydrates</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C00186_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_C00022_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00705" name="Methylmalonate-semialdehyde dehydrogenase [inositol]
(EC 1.2.1.27)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU39760</p>
      <p>GENE_LIST: BSU39760</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00222_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C00011_c"/>
  </listOfProducts>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00707" name="Delta-1-pyrroline-5-carboxylate dehydrogenase (EC
1.5.1.12)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU03210 or BSU37780 )</p>
      <p>GENE_LIST: BSU03210 BSU37780</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00001_c" stoichiometry="2"/>
    <speciesReference species="M_C03912_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00025_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00710" name="Aldehyde dehydrogenase (EC 1.2.1.3)">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: ( BSU07350 or BSU37960 or BSU19310 or BSU38830 or
BSU39860 )</p>
  <p>GENE_LIST: BSU07350 BSU37960 BSU19310 BSU38830 BSU39860</p>
  <p>SUBSYSTEM: Carbohydrates</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00084_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c" stoichiometry="2"/>
  <speciesReference species="M_C00033_c"/>
  <speciesReference species="M_C00004_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00714" name="Succinate-semialdehyde dehydrogenase [NADP+] (EC
1.2.1.16)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU03910</p>
      <p>GENE_LIST: BSU03910</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00232_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>

```

```

    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C00042_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00717" name="Glyoxylate reductase (EC 1.1.1.26)|Glyoxylate reductase
(EC 1.1.1.79)|Hydroxypyruvate reductase (EC 1.1.1.81)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU34680</p>
      <p>GENE_LIST: BSU34680</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00160_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00048_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00719" name="Nucleoside 5-triphosphatase RdgB (dHAPTP, dITP,

```



```

XTP-specific) (EC 3.6.1.15)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU28360</p>
      <p>GENE_LIST: BSU28360</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00081_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00104_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00722" name="Nucleoside diphosphate kinase (EC 2.7.4.6)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22730</p>
      <p>GENE_LIST: BSU22730</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00104_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00081_c"/>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00734" name="Aspartate/tyrosine/aromatic aminotransferase;Biosynthetic
Aromatic amino acid aminotransferase beta (EC 2.6.1.57)|Histidinol-phosphate aminotransferase
(EC 2.6.1.9)(BSU22620)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU22620 or BSU09570 )</p>
      <p>GENE_LIST: BSU22620 BSU09570</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00026_c"/>
    <speciesReference species="M_C00082_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C01179_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00748" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

```

    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Carbohydrates</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00346_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00014_c"/>
  <speciesReference species="M_C00084_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00749" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00189_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C00084_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>

```

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00753" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00186_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00058_c"/>
    <speciesReference species="M_C00084_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00754" name="Alcohol dehydrogenase (EC 1.1.1.1);alcohol
dehydrogenase(BSU26970)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU18430 or BSU26970 or BSU10320 or
BSU27010 )</p>
      <p>GENE_LIST: BSU18430 BSU26970 BSU10320 BSU27010</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C00469_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_C00084_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00765" name="Glucosamine-6-phosphate deaminase (EC 3.5.99.6)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU02360 or BSU35020 )</p>
      <p>GENE_LIST: BSU02360 BSU35020</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00352_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C05345_c"/>
    <speciesReference species="M_C00014_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00768" name="Glucosamine--fructose-6-phosphate aminotransferase
[isomerizing] (EC 2.6.1.16);glucosamine--fructose-6-phosphate aminotransferase
(isomerizing)(BSU01900)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU01780</p>
      <p>GENE_LIST: BSU01780</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C05345_c"/>
    <speciesReference species="M_C00064_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C00352_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00782" name="Cystathionine beta-lyase (EC 4.4.1.8)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU11880</p>
      <p>GENE_LIST: BSU11880</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00097_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00022_c"/>
  <speciesReference species="M_C00014_c"/>
  <speciesReference species="M_C00283_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00802" name="Alpha-glucosidase (EC 3.2.1.20)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU31290</p>
      <p>GENE_LIST: BSU31290</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00089_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00267_c"/>
    <speciesReference species="M_C00095_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

<reaction id="R_R00810" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00089_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C01742_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00818" name="Salicylate hydroxylase (EC 1.14.13.1)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU07230</p>
      <p>GENE_LIST: BSU07230</p>
      <p>SUBSYSTEM: Metabolism of Aromatic Compounds</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C00805_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00090_c"/>
  </listOfProducts>

```



```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00837" name="Trehalose-6-phosphate hydrolase (EC 3.2.1.93)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU07810</p>
      <p>GENE_LIST: BSU07810</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00689_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00267_c"/>
    <speciesReference species="M_C00668_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00838" name="Maltose-6'-phosphate glucosidase (EC 3.2.1.122)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08180</p>
      <p>GENE_LIST: BSU08180</p>

```

```

    <p>SUBSYSTEM: Carbohydrates</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C02995_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00267_c"/>
  <speciesReference species="M_C00668_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00839" name="6-phospho-beta-glucosidase (EC 3.2.1.86)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU38560 or BSU40110 )</p>
      <p>GENE_LIST: BSU38560 BSU40110</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C04534_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00267_c"/>
    <speciesReference species="M_C00668_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>

```

```

        <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00842" name="Glycerol-3-phosphate dehydrogenase [NAD(P)+] (EC
1.1.1.94)">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: BSU22830</p>
            <p>GENE_LIST: BSU22830</p>
            <p>SUBSYSTEM: Carbohydrates</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00003_c"/>
        <speciesReference species="M_C00093_c"/>
    </listOfReactants>
    <listOfProducts>
        <speciesReference species="M_C00080_c"/>
        <speciesReference species="M_C00004_c"/>
        <speciesReference species="M_C00111_c"/>
    </listOfProducts>
    <kineticLaw>
        <math xmlns="http://www.w3.org/1998/Math/MathML">
            <ci> FLUX_VALUE </ci>
        </math>
        <listOfParameters>
            <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
            <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
            <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
        </listOfParameters>
    </kineticLaw>
</reaction>
<reaction id="R_R00847" name="Glycerol kinase (EC 2.7.1.30)" reversible="false">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: BSU09290</p>
            <p>GENE_LIST: BSU09290</p>
            <p>SUBSYSTEM: Carbohydrates</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00002_c"/>

```

```

    <speciesReference species="M_C00116_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00093_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00856" name="Glycerol-3-phosphate cytidyltransferase (EC 2.7.7.39)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35740</p>
      <p>GENE_LIST: BSU35740</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00063_c"/>
    <speciesReference species="M_C00093_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00513_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

<reaction id="R\_R00858" name="Sulfite reductase [NADPH] hemoprotein beta-component (EC 1.8.1.2);Sulfite reductase [NADPH] flavoprotein alpha-component (EC 1.8.1.2)(BSU33440)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU33430 and BSU33440 )</p>

<p>GENE\_LIST: BSU33430 BSU33440</p>

<p>SUBSYSTEM: Sulfur Metabolism</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c" stoichiometry="4"/>

<speciesReference species="M\_C00005\_c" stoichiometry="3"/>

<speciesReference species="M\_C11481\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00006\_c" stoichiometry="3"/>

<speciesReference species="M\_C00001\_c" stoichiometry="3"/>

<speciesReference species="M\_C00283\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_R00867" name="Fructokinase (EC 2.7.1.4)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU05860 or BSU06170 )</p>

<p>GENE\_LIST: BSU05860 BSU06170</p>

<p>SUBSYSTEM: Carbohydrates</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00002\_c"/>

<speciesReference species="M\_C00095\_c"/>

</listOfReactants>

<listOfProducts>

```

    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C05345_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00875" name="Sorbitol dehydrogenase (EC 1.1.1.14)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU06150</p>
      <p>GENE_LIST: BSU06150</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00794_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00095_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00878" name="Xylose isomerase (EC 5.3.1.5)">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: BSU17600</p>
  <p>GENE_LIST: BSU17600</p>
  <p>SUBSYSTEM: Carbohydrates</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00267_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00095_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00897" name="Cysteine synthase (EC 2.5.1.47)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU29970 or BSU00730 )</p>
      <p>GENE_LIST: BSU29970 BSU00730</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00979_c"/>
    <speciesReference species="M_C00283_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00033_c"/>
    <speciesReference species="M_C00097_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00899" name="Probable cytosol aminopeptidase (EC 3.4.11.1) (Leucine
aminopeptidase) (LAP) (Leucyl aminopeptidase)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32050</p>
      <p>GENE_LIST: BSU32050</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01419_c"/>
    <speciesReference species="M_C00001_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00097_c"/>
    <speciesReference species="M_C00037_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00921" name="Phosphate acetyltransferase (EC 2.3.1.8)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37660</p>
      <p>GENE_LIST: BSU37660</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>

```



```

    <speciesReference species="M_C00100_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C02876_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00927" name="3-ketoacyl-CoA thiolase (EC 2.3.1.16)|Acetyl-CoA
acetyltransferase (EC 2.3.1.9);3-ketoacyl-CoA thiolase [isoleucine degradation] (EC
2.3.1.16)(BSU24170)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU32830 or BSU10350 or BSU24170 )</p>
      <p>GENE_LIST: BSU32830 BSU10350 BSU24170</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00100_c"/>
    <speciesReference species="M_C00024_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C03344_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```

```

        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00931" name="2-methylcitrate synthase (EC 2.3.3.5)" reversible="false">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: BSU24140</p>
            <p>GENE_LIST: BSU24140</p>
            <p>SUBSYSTEM: Carbohydrates</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00100_c"/>
        <speciesReference species="M_C00001_c"/>
        <speciesReference species="M_C00036_c"/>
    </listOfReactants>
    <listOfProducts>
        <speciesReference species="M_C00080_c"/>
        <speciesReference species="M_C00010_c"/>
        <speciesReference species="M_C02225_c"/>
    </listOfProducts>
    <kineticLaw>
        <math xmlns="http://www.w3.org/1998/Math/MathML">
            <ci> FLUX_VALUE </ci>
        </math>
        <listOfParameters>
            <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
            <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
            <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
        </listOfParameters>
    </kineticLaw>
</reaction>
<reaction id="R_R00935" name="Methylmalonate-semialdehyde dehydrogenase [inositol]
(EC 1.2.1.27)">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: BSU39760</p>
            <p>GENE_LIST: BSU39760</p>
            <p>SUBSYSTEM: Carbohydrates</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00010_c"/>

```

```

    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C06002_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00100_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00011_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00939" name="Dihydrofolate reductase (EC 1.5.1.3)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU21810</p>
      <p>GENE_LIST: BSU21810</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00101_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C00415_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00942" name="Dihydrofolate synthase (EC 6.3.2.12)|Folylpolyglutamate
synthase (EC 6.3.2.17)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU28080</p>
      <p>GENE_LIST: BSU28080</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C00101_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C09332_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00943" name="Methenyltetrahydrofolate cyclohydrolase (EC
3.5.4.9)|Methylenetetrahydrofolate dehydrogenase (NADP+) (EC 1.5.1.5)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU24310</p>
      <p>GENE_LIST: BSU24310</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00058_c"/>
    <speciesReference species="M_C00101_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00234_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00944" name="Formyltetrahydrofolate deformylase (EC 3.5.1.10)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13110</p>
      <p>GENE_LIST: BSU13110</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00234_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00058_c"/>
    <speciesReference species="M_C00101_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00945" name="Serine hydroxymethyltransferase (EC 2.1.2.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36900</p>
      <p>GENE_LIST: BSU36900</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00143_c"/>
    <speciesReference species="M_C00037_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00065_c"/>
    <speciesReference species="M_C00101_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00946" name="Methionine synthase II (cobalamin-independent)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU13180 or ( BSU38950 and BSU38960 ) )</p>
      <p>GENE_LIST: BSU13180 BSU38950 BSU38960</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00155_c"/>
    <speciesReference species="M_C00440_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00073_c"/>
  <speciesReference species="M_C00101_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00948" name="Glucose-1-phosphate adenylyltransferase (EC
2.7.7.27);Glycogen biosynthesis protein GlgD, glucose-1-phosphate adenylyltransferase
family(BSU30960)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU30960 and BSU30970 )</p>
      <p>GENE_LIST: BSU30960 BSU30970</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00103_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00498_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_R00956" name="Glucose-1-phosphate cytidyltransferase (EC 2.7.7.33)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU07270</p>
      <p>GENE_LIST: BSU07270</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00103_c"/>
    <speciesReference species="M_C00063_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00501_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00959" name="Phosphoglucosamine mutase (EC 5.4.2.10)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU01770</p>
      <p>GENE_LIST: BSU01770</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00103_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00668_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```



```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00962" name="Uridine kinase (EC 2.7.1.48) [C1]">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27330</p>
      <p>GENE_LIST: BSU27330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00081_c"/>
    <speciesReference species="M_C00475_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00055_c"/>
    <speciesReference species="M_C00104_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00963" name="5'-nucleotidase yjjG (EC 3.1.3.5);2',3'-cyclic-nucleotide
2'-phosphodiesterase (EC 3.1.4.16)|5'-nucleotidase (EC 3.1.3.5)(BSU07840)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU07840 or BSU07330 )</p>
      <p>GENE_LIST: BSU07840 BSU07330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00105_c"/>
  <speciesReference species="M_C00001_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00299_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00964" name="Uridine kinase (EC 2.7.1.48) [C1]" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27330</p>
      <p>GENE_LIST: BSU27330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00299_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00105_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00965" name="Orotidine 5'-phosphate decarboxylase (EC 4.1.1.23)"
reversible="false">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: BSU15550</p>
            <p>GENE_LIST: BSU15550</p>
            <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00080_c"/>
        <speciesReference species="M_C01103_c"/>
    </listOfReactants>
    <listOfProducts>
        <speciesReference species="M_C00105_c"/>
        <speciesReference species="M_C00011_c"/>
    </listOfProducts>
    <kineticLaw>
        <math xmlns="http://www.w3.org/1998/Math/MathML">
            <ci> FLUX_VALUE </ci>
        </math>
        <listOfParameters>
            <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
            <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
            <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
        </listOfParameters>
    </kineticLaw>
</reaction>
<reaction id="R_R00966" name="Pyrimidine operon regulatory protein PyrR|Uracil
phosphoribosyltransferase (EC 2.4.2.9);phosphoribosyltransferase(BSU36890)"
reversible="false">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: ( BSU15470 or BSU36890 )</p>
            <p>GENE_LIST: BSU15470 BSU36890</p>
            <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00119_c"/>

```

```

    <speciesReference species="M_C00106_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00105_c"/>
    <speciesReference species="M_C00013_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00967" name="Uridine kinase (EC 2.7.1.48) [C1]" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27330</p>
      <p>GENE_LIST: BSU27330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00299_c"/>
    <speciesReference species="M_C00075_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00105_c"/>
    <speciesReference species="M_C00015_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

<reaction id="R_R00968" name="Uridine kinase (EC 2.7.1.48) [C1]" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27330</p>
      <p>GENE_LIST: BSU27330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00299_c"/>
    <speciesReference species="M_C00044_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00105_c"/>
    <speciesReference species="M_C00035_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00970" name="Uridine kinase (EC 2.7.1.48) [C1]">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27330</p>
      <p>GENE_LIST: BSU27330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00299_c"/>
    <speciesReference species="M_C00081_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00105_c"/>
    <speciesReference species="M_C00104_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00985" name="Anthranilate synthase, aminase component (EC
4.1.3.27);Anthranilate synthase, amidotransferase component (EC 4.1.3.27)|Para-aminobenzoate
synthase, amidotransferase component (EC 2.6.1.85)(BSU00750)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU22680 and BSU00750 )</p>
      <p>GENE_LIST: BSU22680 BSU00750</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C00251_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00022_c"/>
    <speciesReference species="M_C00108_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R00986" name="Anthranilate synthase, aminase component (EC
4.1.3.27);Anthranilate synthase, amidotransferase component (EC 4.1.3.27)|Para-aminobenzoate
synthase, amidotransferase component (EC 2.6.1.85)(BSU00750)" reversible="false">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: ( BSU00750 and BSU22680 )</p>
    <p>GENE_LIST: BSU00750 BSU22680</p>
    <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00064_c"/>
  <speciesReference species="M_C00251_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00025_c"/>
  <speciesReference species="M_C00022_c"/>
  <speciesReference species="M_C00108_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00996" name="Threonine dehydratase biosynthetic (EC 4.3.1.19)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU21770</p>
      <p>GENE_LIST: BSU21770</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00188_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C00109_c"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R00999" name="Cystathionine gamma-synthase (EC 2.5.1.48)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU11870</p>
      <p>GENE_LIST: BSU11870</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01118_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C00042_c"/>
    <speciesReference species="M_C00109_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01001" name="Cystathionine gamma-lyase (EC 4.4.1.1)"
reversible="false">
  <notes>

```



```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: BSU27250</p>
  <p>GENE_LIST: BSU27250</p>
  <p>SUBSYSTEM: Amino Acids and Derivatives</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C02291_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00014_c"/>
  <speciesReference species="M_C00097_c"/>
  <speciesReference species="M_C00109_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01010" name="Alkaline phosphatase (EC 3.1.3.1)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU05740 or BSU09410 )</p>
      <p>GENE_LIST: BSU05740 BSU09410</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00111_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00184_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01015" name="Triosephosphate isomerase (EC
5.3.1.1);Glyceraldehyde-3-phosphate ketol-isomerase (EC 5.3.1.1)(BSU39690)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU33920 or BSU39690 )</p>
      <p>GENE_LIST: BSU33920 BSU39690</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00118_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00111_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01016" name="Methylglyoxal synthase (EC 4.2.3.3)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22480</p>
      <p>GENE_LIST: BSU22480</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00111_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00546_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01021" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00114_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00588_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </kineticLaw>
  </reaction>
  <reaction id="R_R01030" name="Glycerophosphoryl diester phosphodiesterase, periplasmic
(EC      3.1.4.46);Glycerophosphoryl      diester      phosphodiesterase      (EC
3.1.4.46)(BSU09620);Glycerophosphoryl diester phosphodiesterase family protein(BSU24180)">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: ( BSU09620 or BSU02130 or BSU24180 )</p>
        <p>GENE_LIST: BSU09620 BSU02130 BSU24180</p>
        <p>SUBSYSTEM: Carbohydrates</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00001_c"/>
      <speciesReference species="M_C00670_c"/>
    </listOfReactants>
    <listOfProducts>
      <speciesReference species="M_C00093_c"/>
      <speciesReference species="M_C00114_c"/>
    </listOfProducts>
    <kineticLaw>
      <math xmlns="http://www.w3.org/1998/Math/MathML">
        <ci> FLUX_VALUE </ci>
      </math>
      <listOfParameters>
        <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
      </listOfParameters>
    </kineticLaw>
  </reaction>
  <reaction id="R_R01034" name="">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: </p>
        <p>GENE_LIST: </p>
        <p>SUBSYSTEM: Carbohydrates</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00003_c"/>
      <speciesReference species="M_C00116_c"/>
    </listOfReactants>
    <listOfProducts>

```

```

    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00184_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01036" name="Alcohol dehydrogenase (EC 1.1.1.1);alcohol
dehydrogenase(BSU26970)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU18430 or BSU26970 or BSU10320 or
BSU27010 )</p>
      <p>GENE_LIST: BSU18430 BSU26970 BSU10320 BSU27010</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00116_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00577_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_R01049" name="Ribose-phosphate pyrophosphokinase" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00510</p>
      <p>GENE_LIST: BSU00510</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00117_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00119_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01051" name="Ribokinase (EC 2.7.1.15)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35920</p>
      <p>GENE_LIST: BSU35920</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00121_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00117_c"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01054" name="ADP-ribose pyrophosphatase (EC 3.6.1.13)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU23610</p>
      <p>GENE_LIST: BSU23610</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00301_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00117_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01056" name="Ribose 5-phosphate isomerase B (EC 5.3.1.6)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36920</p>
      <p>GENE_LIST: BSU36920</p>

```

```

    <p>SUBSYSTEM: Carbohydrates</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00117_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00199_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01057" name="Phosphopentomutase (EC 5.4.2.7)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU23500</p>
      <p>GENE_LIST: BSU23500</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00620_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00117_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```



```

</reaction>
<reaction id="R_R01061" name="NAD-dependent glyceraldehyde-3-phosphate
dehydrogenase (EC 1.2.1.12)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU33940</p>
      <p>GENE_LIST: BSU33940</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00118_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00236_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01063" name="NADPH-dependent glyceraldehyde-3-phosphate
dehydrogenase (EC 1.2.1.13)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU29020</p>
      <p>GENE_LIST: BSU29020</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C00236_c"/>
  </listOfReactants>
  <listOfProducts>

```

```

    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00118_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01066" name="Deoxyribose-phosphate aldolase (EC 4.1.2.4)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU39420</p>
      <p>GENE_LIST: BSU39420</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00673_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00118_c"/>
    <speciesReference species="M_C00084_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01069" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

```

    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Carbohydrates</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C03785_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00118_c"/>
  <speciesReference species="M_C00111_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01070" name="Fructose-bisphosphate aldolase class II (EC 4.1.2.13)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37120</p>
      <p>GENE_LIST: BSU37120</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C05378_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00118_c"/>
    <speciesReference species="M_C00111_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01071" name="ATP phosphoribosyltransferase catalytic subunit (EC
2.4.2.17);ATP phosphoribosyltransferase regulatory subunit (EC 2.4.2.17)(BSU34930)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU34920 and BSU34930 )</p>
      <p>GENE_LIST: BSU34920 BSU34930</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00119_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C02739_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01072" name="Amidophosphoribosyltransferase (EC 2.4.2.14)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU06490</p>
      <p>GENE_LIST: BSU06490</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00064_c"/>
    <speciesReference species="M_C00119_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C03090_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01073" name="Anthranilate phosphoribosyltransferase (EC 2.4.2.18)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22670</p>
      <p>GENE_LIST: BSU22670</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00108_c"/>
    <speciesReference species="M_C00119_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C04302_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01082" name="Fumarate hydratase class II (EC 4.2.1.2)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU33040</p>
      <p>GENE_LIST: BSU33040</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00149_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00122_c"/>
    <speciesReference species="M_C00001_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01083" name="Adenylosuccinate lyase (EC 4.3.2.2)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU06440</p>
      <p>GENE_LIST: BSU06440</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C03794_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00122_c"/>
    <speciesReference species="M_C00020_c"/>
  </listOfProducts>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01086" name="Argininosuccinate lyase (EC 4.3.2.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU29440</p>
      <p>GENE_LIST: BSU29440</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C03406_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00062_c"/>
    <speciesReference species="M_C00122_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01088" name="Leucine dehydrogenase (EC 1.4.1.9)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU24080</p>
      <p>GENE_LIST: BSU24080</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>

```

```

</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00123_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_C00014_c"/>
  <speciesReference species="M_C00233_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01090" name="Branched-chain amino acid aminotransferase (EC
2.6.1.42)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU02390 or BSU38550 )</p>
      <p>GENE_LIST: BSU02390 BSU38550</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00026_c"/>
    <speciesReference species="M_C00123_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C00233_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </kineticLaw>
</reaction>

```



```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01092" name="Galactokinase (EC 2.7.1.6)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU38200</p>
      <p>GENE_LIST: BSU38200</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00124_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00446_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01101" name="Alpha-galactosidase (EC 3.2.1.22)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30300</p>
      <p>GENE_LIST: BSU30300</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C05402_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00267_c"/>
    <speciesReference species="M_C00124_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01103" name="Alpha-galactosidase (EC 3.2.1.22)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30300</p>
      <p>GENE_LIST: BSU30300</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00492_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00124_c"/>
    <speciesReference species="M_C00089_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_R01117" name="N-Acetylneuraminate cytidyltransferase (EC 2.7.7.43)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37850</p>
      <p>GENE_LIST: BSU37850</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00063_c"/>
    <speciesReference species="M_C00270_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00128_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01123" name="Isopentenyl-diphosphate delta-isomerase, FMN-dependent
(EC 5.3.3.2)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22870</p>
      <p>GENE_LIST: BSU22870</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00129_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00235_c"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01126" name="5'-nucleotidase yjiG (EC 3.1.3.5);2',3'-cyclic-nucleotide
2'-phosphodiesterase (EC 3.1.4.16)|5'-nucleotidase (EC 3.1.3.5)(BSU07840)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU07840 or BSU07330 )</p>
      <p>GENE_LIST: BSU07840 BSU07330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00130_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00294_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01127" name="IMP cyclohydrolase (EC
3.5.4.10)|Phosphoribosylaminoimidazolecarboxamide formyltransferase (EC 2.1.2.3)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

<p>GENE\_ASSOCIATION: BSU06520</p>  
 <p>GENE\_LIST: BSU06520</p>  
 <p>SUBSYSTEM: Nucleosides and Nucleotides</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00001\_c"/>  
 <speciesReference species="M\_C00130\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C04734\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_R01130" name="Inosine-5'-monophosphate dehydrogenase;IMP  
 dehydrogenase(BSU09230)">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: BSU00090</p>  
 <p>GENE\_LIST: BSU00090</p>  
 <p>SUBSYSTEM: Nucleosides and Nucleotides</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00003\_c"/>  
 <speciesReference species="M\_C00001\_c"/>  
 <speciesReference species="M\_C00130\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00004\_c"/>  
 <speciesReference species="M\_C00655\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01132" name="Hypoxanthine-guanine phosphoribosyltransferase (EC
2.4.2.8)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00680</p>
      <p>GENE_LIST: BSU00680</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00262_c"/>
    <speciesReference species="M_C00119_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00130_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01134" name="GMP reductase (EC 1.7.1.7)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32130</p>
      <p>GENE_LIST: BSU32130</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00080_c" stoichiometry="2"/>
  <speciesReference species="M_C00005_c"/>
  <speciesReference species="M_C00144_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00006_c"/>
  <speciesReference species="M_C00014_c"/>
  <speciesReference species="M_C00130_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01135" name="Adenylosuccinate synthetase (EC 6.3.4.4)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU40420</p>
      <p>GENE_LIST: BSU40420</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00044_c"/>
    <speciesReference species="M_C00049_c"/>
    <speciesReference species="M_C00130_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00035_c"/>
    <speciesReference species="M_C03794_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01137" name="Nucleoside diphosphate kinase (EC 2.7.4.6)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22730</p>
      <p>GENE_LIST: BSU22730</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00206_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00131_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01148" name="D-alanine aminotransferase (EC 2.6.1.21) (D-aspartate
aminotransferase) (D-amino acid aminotransferase) (D-amino acid transaminase) (DAAT)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU09670</p>
      <p>GENE_LIST: BSU09670</p>

```



```

    <p>SUBSYSTEM: Amino Acids and Derivatives</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00133_c"/>
  <speciesReference species="M_C00026_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00022_c"/>
  <speciesReference species="M_C00217_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01150" name="D-alanine--D-alanine ligase (EC 6.3.2.4)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU04560</p>
      <p>GENE_LIST: BSU04560</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00133_c" stoichiometry="2"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00993_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01157" name="Agmatinase (EC 3.5.3.11)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37490</p>
      <p>GENE_LIST: BSU37490</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00179_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00134_c"/>
    <speciesReference species="M_C00086_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01163" name="Histidinol dehydrogenase (EC 1.1.1.23)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU34910</p>
      <p>GENE_LIST: BSU34910</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01929_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00135_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01168" name="Histidine ammonia-lyase (EC 4.3.1.3)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU39350</p>
      <p>GENE_LIST: BSU39350</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00135_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C00785_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </kineticLaw>
  </reaction>
  <reaction id="R_R01171" name="Acyl-CoA dehydrogenase, short-chain specific (EC
1.3.99.2)" reversible="false">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: ( BSU37170 or BSU32820 or BSU04520 )</p>
        <p>GENE_LIST: BSU37170 BSU32820 BSU04520</p>
        <p>SUBSYSTEM: Carbohydrates</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00080_c"/>
      <speciesReference species="M_C00004_c"/>
      <speciesReference species="M_C00877_c"/>
    </listOfReactants>
    <listOfProducts>
      <speciesReference species="M_C00003_c"/>
      <speciesReference species="M_C00136_c"/>
    </listOfProducts>
    <kineticLaw>
      <math xmlns="http://www.w3.org/1998/Math/MathML">
        <ci> FLUX_VALUE </ci>
      </math>
      <listOfParameters>
        <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
        <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
      </listOfParameters>
    </kineticLaw>
  </reaction>
  <reaction id="R_R01174" name="Phosphate butyryltransferase (EC 2.3.1.19)">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU24090</p>
        <p>GENE_LIST: BSU24090</p>
        <p>SUBSYSTEM: Carbohydrates</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00009_c"/>
      <speciesReference species="M_C00080_c"/>
      <speciesReference species="M_C00136_c"/>
    </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00010_c"/>
  <speciesReference species="M_C02527_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01177" name="3-ketoacyl-CoA thiolase (EC 2.3.1.16)|Acetyl-CoA
acetyltransferase (EC 2.3.1.9);3-ketoacyl-CoA thiolase [isoleucine degradation] (EC
2.3.1.16)(BSU24170)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU32830 or BSU10350 or BSU24170 )</p>
      <p>GENE_LIST: BSU32830 BSU10350 BSU24170</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C00136_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C05269_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

<reaction id="R\_R01179" name="Acetoacetyl-CoA transferase, beta subunit (EC 2.8.3.8);Acetoacetyl-CoA transferase, alpha subunit (EC 2.8.3.8)(BSU19730)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU19720 and BSU19730 )</p>

<p>GENE\_LIST: BSU19720 BSU19730</p>

<p>SUBSYSTEM: Carbohydrates</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00033\_c"/>

<speciesReference species="M\_C00136\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00024\_c"/>

<speciesReference species="M\_C00246\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_R01181" name="">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: </p>

<p>GENE\_LIST: </p>

<p>SUBSYSTEM: Carbohydrates</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00630\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00136\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01183" name="Myo-inositol 2-dehydrogenase (EC 1.1.1.18);myo-inositol
2-dehydrogenase(BSU27770);Myo-inositol 2-dehydrogenase like (EC 1.1.1.18)(BSU10850)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU39700 or BSU10850 or BSU27770 )</p>
      <p>GENE_LIST: BSU39700 BSU10850 BSU27770</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00137_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00691_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01185" name="Myo-inositol-1(or 4)-monophosphatase (EC 3.1.3.25)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU14670</p>
      <p>GENE_LIST: BSU14670</p>

```

```

    <p>SUBSYSTEM: Carbohydrates</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C01177_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00137_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01186" name="Myo-inositol-1(or 4)-monophosphatase (EC 3.1.3.25)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU14670</p>
      <p>GENE_LIST: BSU14670</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C03546_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00137_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </kineticLaw>
</reaction>

```



```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01187" name="Myo-inositol-1(or 4)-monophosphatase (EC 3.1.3.25)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU14670</p>
      <p>GENE_LIST: BSU14670</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C04006_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00137_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01201" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00140_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00357_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01207" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00140_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00645_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_R01213" name="2-isopropylmalate synthase (EC 2.3.3.13)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU28280</p>
      <p>GENE_LIST: BSU28280</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00141_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C02504_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01214" name="Branched-chain amino acid aminotransferase (EC
2.6.1.42)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU02390 or BSU38550 )</p>
      <p>GENE_LIST: BSU02390 BSU38550</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00026_c"/>
    <speciesReference species="M_C00183_c"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00025_c"/>
  <speciesReference species="M_C00141_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01220" name="Methenyltetrahydrofolate cyclohydrolase (EC
3.5.4.9)|Methylenetetrahydrofolate dehydrogenase (NADP+) (EC 1.5.1.5)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU24310</p>
      <p>GENE_LIST: BSU24310</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00143_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C00445_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01221" name="Glycine dehydrogenase [decarboxylating] (glycine cleavage

```

system P2 protein) (EC 1.4.4.2);Glycine dehydrogenase [decarboxylating] (glycine cleavage system P1 protein) (EC 1.4.4.2)(BSU24560);Aminomethyltransferase (glycine cleavage system T protein) (EC 2.1.2.10)(BSU24570);Glycine cleavage system H protein(BSU32800)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU24550 and BSU24560 and BSU24570 and BSU32800 )</p>

<p>GENE\_LIST: BSU24550 BSU24560 BSU24570 BSU32800</p>

<p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00003\_c"/>

<speciesReference species="M\_C00037\_c"/>

<speciesReference species="M\_C00101\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00004\_c"/>

<speciesReference species="M\_C00011\_c"/>

<speciesReference species="M\_C00014\_c"/>

<speciesReference species="M\_C00143\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_R01224" name="5,10-methylenetetrahydrofolate reductase (EC 1.5.1.20)|Homolog of homocysteine-binding domain">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU11010</p>

<p>GENE\_LIST: BSU11010</p>

<p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>

</html>

</notes>

<listOfReactants>

```

    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00440_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C00143_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01226" name="3-methyl-2-oxobutanoate hydroxymethyltransferase (EC
2.1.2.11)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22430</p>
      <p>GENE_LIST: BSU22430</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00143_c"/>
    <speciesReference species="M_C00141_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00101_c"/>
    <speciesReference species="M_C00966_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01227" name="5'-nucleotidase yjjG (EC 3.1.3.5);2',3'-cyclic-nucleotide
2'-phosphodiesterase (EC 3.1.4.16)|5'-nucleotidase (EC 3.1.3.5)(BSU07840)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU07840 or BSU07330 )</p>
      <p>GENE_LIST: BSU07840 BSU07330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00144_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00387_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01229" name="Hypoxanthine-guanine phosphoribosyltransferase (EC
2.4.2.8)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00680</p>
      <p>GENE_LIST: BSU00680</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00242_c"/>

```

```

    <speciesReference species="M_C00119_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00144_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01230" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C00655_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00144_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>

```



```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01231" name="GMP synthase [glutamine-hydrolyzing] (EC 6.3.5.2)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU06360</p>
      <p>GENE_LIST: BSU06360</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00064_c"/>
    <speciesReference species="M_C00655_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C00144_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01244" name="Adenine deaminase (EC 3.5.4.2);adenine
deaminase(BSU14520)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU14520 or BSU06560 )</p>
      <p>GENE_LIST: BSU14520 BSU06560</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00147_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00014_c"/>
  <speciesReference species="M_C00262_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01248" name="Pyrroline-5-carboxylate reductase (EC 1.5.1.2),
ProG-like;Pyrroline-5-carboxylate reductase (EC 1.5.1.2)(BSU18480);Pyrroline-5-carboxylate
reductase (EC 1.5.1.2)(BSU23800);Proline dehydrogenase (Proline oxidase) (EC 1.5.99.8)
(BSU03200)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU12910 or BSU18480 or BSU23800 or
BSU03200 )</p>
      <p>GENE_LIST: BSU12910 BSU18480 BSU23800 BSU03200</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00148_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C03912_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01251" name="Pyrroline-5-carboxylate reductase (EC 1.5.1.2),
ProG-like;Pyrroline-5-carboxylate reductase (EC 1.5.1.2)(BSU18480);Pyrroline-5-carboxylate
reductase (EC 1.5.1.2)(BSU23800)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU12910 or BSU18480 or BSU23800 )</p>
      <p>GENE_LIST: BSU12910 BSU18480 BSU23800</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00148_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C03912_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01253" name="Proline dehydrogenase (Proline oxidase) (EC 1.5.99.8) ">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32850</p>
      <p>GENE_LIST: BSU32850</p>

```

<p>SUBSYSTEM: Amino Acids and Derivatives</p>  
</html>  
</notes>  
<listOfReactants>  
<speciesReference species="M\_C00148\_c"/>  
<speciesReference species="M\_C00016\_c"/>  
</listOfReactants>  
<listOfProducts>  
<speciesReference species="M\_C03912\_c"/>  
<speciesReference species="M\_C01352\_c"/>  
</listOfProducts>  
<kineticLaw>  
<math xmlns="http://www.w3.org/1998/Math/MathML">  
<ci> FLUX\_VALUE </ci>  
</math>  
<listOfParameters>  
<parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
</listOfParameters>  
</kineticLaw>  
</reaction>  
<reaction id="R\_R01268" name="Nicotinamidase (EC 3.5.1.19)" reversible="false">  
<notes>  
<html xmlns="http://www.w3.org/1999/xhtml">  
<p>GENE\_ASSOCIATION: ( BSU31760 or BSU00170 )</p>  
<p>GENE\_LIST: BSU31760 BSU00170</p>  
<p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>  
</html>  
</notes>  
<listOfReactants>  
<speciesReference species="M\_C00001\_c"/>  
<speciesReference species="M\_C00153\_c"/>  
</listOfReactants>  
<listOfProducts>  
<speciesReference species="M\_C00014\_c"/>  
<speciesReference species="M\_C00253\_c"/>  
</listOfProducts>  
<kineticLaw>  
<math xmlns="http://www.w3.org/1998/Math/MathML">  
<ci> FLUX\_VALUE </ci>  
</math>  
<listOfParameters>  
<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01280" name="Long-chain-fatty-acid--CoA ligase (EC
6.2.1.3);Acetoacetyl-CoA synthetase [leucine] (EC 6.2.1.16)|Long-chain-fatty-acid--CoA ligase
(EC 6.2.1.3)(BSU18250)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU10270 or BSU28560 or BSU04170 or BSU10360 or
BSU18250 or BSU17180 )</p>
      <p>GENE_LIST: BSU10270 BSU28560 BSU04170 BSU10360 BSU18250
BSU17180</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C00249_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00154_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01286" name="Cystathionine beta-lyase (EC 4.4.1.8)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU11880</p>
      <p>GENE_LIST: BSU11880</p>

```

```

    <p>SUBSYSTEM: Amino Acids and Derivatives</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C02291_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00022_c"/>
  <speciesReference species="M_C00014_c"/>
  <speciesReference species="M_C00155_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01290" name="Cystathionine beta-synthase (EC 4.2.1.22)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27260</p>
      <p>GENE_LIST: BSU27260</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00065_c"/>
    <speciesReference species="M_C00155_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C02291_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01291" name="Autoinducer-2 production protein
LuxS|S-ribosylhomocysteine lyase (EC 4.4.1.21)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30670</p>
      <p>GENE_LIST: BSU30670</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C03539_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00155_c"/>
    <speciesReference species="M_C11838_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01301" name="4-hydroxybenzoyl-CoA thioesterase family active site"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU18040</p>
      <p>GENE_LIST: BSU18040</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>

```

```

    <speciesReference species="M_C02949_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C00156_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01325" name="2-methylisocitrate dehydratase (EC 4.2.1.99)|Aconitate
hydratase (EC 4.2.1.3)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU18000</p>
      <p>GENE_LIST: BSU18000</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00158_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00417_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```



```

</reaction>
<reaction id="R_R01333" name="Aldehyde dehydrogenase (EC 1.2.1.3)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU38830 or BSU39860 or BSU19310 or BSU07350 or
BSU37960 )</p>
      <p>GENE_LIST: BSU38830 BSU39860 BSU19310 BSU07350 BSU37960</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00266_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00160_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01334" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00988_c"/>
  </listOfReactants>
  <listOfProducts>

```

```

    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00160_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01353" name="Acetate kinase (EC 2.7.2.1)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU29470</p>
      <p>GENE_LIST: BSU29470</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00163_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C02876_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01357" name="Acetoacetyl-CoA synthetase [leucine] (EC

```

6.2.1.16)|Long-chain-fatty-acid--CoA ligase (EC 6.2.1.3)" reversible="false">

```
<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: BSU18250</p>
    <p>GENE_LIST: BSU18250</p>
    <p>SUBSYSTEM: Fatty Acids and Lipids</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00010_c"/>
  <speciesReference species="M_C00164_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00332_c"/>
  <speciesReference species="M_C00013_c"/>
  <speciesReference species="M_C00020_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01360" name="Hydroxymethylglutaryl-CoA lyase (EC 4.1.3.4)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU18230</p>
      <p>GENE_LIST: BSU18230</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00356_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C00164_c"/>
  </listOfProducts>
</reaction>
```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01361" name="D-beta-hydroxybutyrate dehydrogenase (EC 1.1.1.30)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU38970</p>
      <p>GENE_LIST: BSU38970</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C01089_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00164_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01365" name="Butyrate-acetoacetate CoA-transferase subunit B (EC
2.8.3.9);Butyrate-acetoacetate CoA-transferase subunit A (EC 2.8.3.9)(BSU38990)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

<p>GENE\_ASSOCIATION: ( BSU38980 and BSU38990 )</p>  
 <p>GENE\_LIST: BSU38980 BSU38990</p>  
 <p>SUBSYSTEM: Carbohydrates</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00136\_c"/>  
 <speciesReference species="M\_C00164\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00332\_c"/>  
 <speciesReference species="M\_C00246\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_R01373" name="Prephenate dehydratase (EC 4.2.1.51)" reversible="false">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: BSU27900</p>  
 <p>GENE\_LIST: BSU27900</p>  
 <p>SUBSYSTEM: Amino Acids and Derivatives</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00254\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00001\_c"/>  
 <speciesReference species="M\_C00011\_c"/>  
 <speciesReference species="M\_C00166\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01387" name="UDP-glucuronate 5'-epimerase (EC 5.1.3.12)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30870</p>
      <p>GENE_LIST: BSU30870</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00167_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C02330_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01388" name="Hydroxypyruvate reductase (EC 1.1.1.81)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU18560</p>
      <p>GENE_LIST: BSU18560</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00258_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_C00168_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01397" name="Aspartate carbamoyltransferase (EC 2.1.3.2)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15490</p>
      <p>GENE_LIST: BSU15490</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00049_c"/>
    <speciesReference species="M_C00169_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00438_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </kineticLaw>
  </reaction>
  <reaction id="R_R01398" name="Ornithine carbamoyltransferase (EC 2.1.3.3)"
reversible="false">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU11250</p>
        <p>GENE_LIST: BSU11250</p>
        <p>SUBSYSTEM: Amino Acids and Derivatives</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00169_c"/>
      <speciesReference species="M_C00077_c"/>
    </listOfReactants>
    <listOfProducts>
      <speciesReference species="M_C00009_c"/>
      <speciesReference species="M_C00080_c" stoichiometry="2"/>
      <speciesReference species="M_C00327_c"/>
    </listOfProducts>
    <kineticLaw>
      <math xmlns="http://www.w3.org/1998/Math/MathML">
        <ci> FLUX_VALUE </ci>
      </math>
      <listOfParameters>
        <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
        <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
      </listOfParameters>
    </kineticLaw>
  </reaction>
  <reaction id="R_R01401" name="5'-methylthioadenosine nucleosidase (EC
3.2.2.16)|S-adenosylhomocysteine nucleosidase (EC 3.2.2.9)">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU27270</p>
        <p>GENE_LIST: BSU27270</p>
        <p>SUBSYSTEM: Amino Acids and Derivatives</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00001_c"/>
      <speciesReference species="M_C00170_c"/>
    </listOfReactants>

```



```

<listOfProducts>
  <speciesReference species="M_C00147_c"/>
  <speciesReference species="M_C03089_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01432" name="Xylose isomerase (EC 5.3.1.5)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU17600</p>
      <p>GENE_LIST: BSU17600</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00181_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00310_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01434" name="Leucine dehydrogenase (EC 1.4.1.9)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU24080</p>

```

```

    <p>GENE_LIST: BSU24080</p>
    <p>SUBSYSTEM: Amino Acids and Derivatives</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00183_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_C00014_c"/>
  <speciesReference species="M_C00141_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01446" name="Predicted lactaldehyde dehydrogenase (EC
1.2.1.22)|Predicted rhamnulose-1-phosphate aldolase (EC 4.1.2.19)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU31220</p>
      <p>GENE_LIST: BSU31220</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00424_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00186_c"/>
  </listOfProducts>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01465" name="L-threonine 3-dehydrogenase (EC 1.1.1.103)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16990</p>
      <p>GENE_LIST: BSU16990</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00188_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C03508_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01466" name="Threonine synthase (EC 4.2.3.1)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32250</p>
    </html>
  </notes>

```

<p>GENE\_LIST: BSU32250</p>  
 <p>SUBSYSTEM: Amino Acids and Derivatives</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00001\_c"/>  
 <speciesReference species="M\_C01102\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00009\_c"/>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00188\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_R01470" name="Glycerophosphoryl diester phosphodiesterase, periplasmic  
 (EC 3.1.4.46);Glycerophosphoryl diester phosphodiesterase (EC  
 3.1.4.46)(BSU09620);Glycerophosphoryl diester phosphodiesterase family protein(BSU24180)">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: ( BSU09620 or BSU02130 or BSU24180 )</p>  
 <p>GENE\_LIST: BSU09620 BSU02130 BSU24180</p>  
 <p>SUBSYSTEM: Carbohydrates</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00001\_c"/>  
 <speciesReference species="M\_C01233\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00093\_c"/>  
 <speciesReference species="M\_C00189\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01482" name="Uronate isomerase (EC 5.3.1.12)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU12300</p>
      <p>GENE_LIST: BSU12300</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00191_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00905_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01504" name="2,3-dihydroxybenzoate-AMP ligase (EC 2.7.7.58)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU31980</p>
      <p>GENE_LIST: BSU31980</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00196_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C04030_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01505" name="2,3-dihydro-2,3-dihydroxybenzoate dehydrogenase (EC
1.3.1.28)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32000</p>
      <p>GENE_LIST: BSU32000</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C04171_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00196_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01512" name="Phosphoglycerate kinase (EC 2.7.2.3)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU33930</p>
      <p>GENE_LIST: BSU33930</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00197_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00236_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01513" name="D-3-phosphoglycerate dehydrogenase (EC 1.1.1.95)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU23070</p>
      <p>GENE_LIST: BSU23070</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00197_c"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_C03232_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01514" name="Glycerate kinase (EC 2.7.1.31)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU40040</p>
      <p>GENE_LIST: BSU40040</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00258_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00197_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01515" name="Acylphosphate phosphohydrolase (EC 3.6.1.7), putative"

```



```

reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU07640</p>
      <p>GENE_LIST: BSU07640</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00236_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00197_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01518" name="2,3-bisphosphoglycerate-independent phosphoglycerate
mutase (EC 5.4.2.1);phosphoglycerate mutase(BSU10340)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU33910</p>
      <p>GENE_LIST: BSU33910</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00631_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00197_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01519" name="Gluconolactonase (EC 3.1.1.17)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU33200</p>
      <p>GENE_LIST: BSU33200</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00198_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00257_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01520" name="Glucose 1-dehydrogenase (EC 1.1.1.47)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU02830 or BSU03930 )</p>
      <p>GENE_LIST: BSU02830 BSU03930</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C00221_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_C00198_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01526" name="Ribulokinase (EC 2.7.1.16)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU28790</p>
      <p>GENE_LIST: BSU28790</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00309_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00199_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01528" name="6-phosphogluconate dehydrogenase, decarboxylating (EC
1.1.1.44);6-phosphogluconate dehydrogenase(BSU25730)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU23860 or BSU40080 or BSU25730 )</p>
      <p>GENE_LIST: BSU23860 BSU40080 BSU25730</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00345_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00199_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01529" name="Ribulose-phosphate 3-epimerase (EC 5.1.3.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15790</p>
      <p>GENE_LIST: BSU15790</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00199_c"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00231_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01540" name="Altronate hydrolase (EC 4.2.1.7)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU12390</p>
      <p>GENE_LIST: BSU12390</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00817_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00204_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01541" name="2-dehydro-3-deoxygluconate kinase (EC 2.7.1.45)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

```

    <p>GENE_ASSOCIATION: BSU22110</p>
    <p>GENE_LIST: BSU22110</p>
    <p>SUBSYSTEM: Carbohydrates</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00204_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C04442_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01542" name="2-deoxy-D-gluconate 3-dehydrogenase (EC 1.1.1.125)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22140</p>
      <p>GENE_LIST: BSU22140</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00204_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C04349_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </kineticLaw>
</reaction>

```

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01547" name="Adenylate kinase (EC 2.7.4.3)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU01370</p>
      <p>GENE_LIST: BSU01370</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00360_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00206_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01548" name="Uridine kinase (EC 2.7.1.48) [C1]" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27330</p>
      <p>GENE_LIST: BSU27330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00475_c"/>
    <speciesReference species="M_C00131_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00055_c"/>
    <speciesReference species="M_C00206_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01549" name="Uridine kinase (EC 2.7.1.48) [C1]" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27330</p>
      <p>GENE_LIST: BSU27330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00299_c"/>
    <speciesReference species="M_C00131_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00105_c"/>
    <speciesReference species="M_C00206_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```



```

</reaction>
<reaction id="R_R01555" name="Maltose phosphorylase (EC 2.4.1.8)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU34570</p>
      <p>GENE_LIST: BSU34570</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00208_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00267_c"/>
    <speciesReference species="M_C00663_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01556" name="Maltose O-acetyltransferase (EC 2.3.1.79)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU40850</p>
      <p>GENE_LIST: BSU40850</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C00208_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>

```

```

    <speciesReference species="M_C02130_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01561" name="Purine nucleoside phosphorylase (EC 2.4.2.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU23490 or BSU19630 )</p>
      <p>GENE_LIST: BSU23490 BSU19630</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00212_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00620_c"/>
    <speciesReference species="M_C00147_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01562" name="5'-nucleotidase yjjG (EC 3.1.3.5);2',3'-cyclic-nucleotide
2'-phosphodiesterase (EC 3.1.4.16)|5'-nucleotidase (EC 3.1.3.5)(BSU07840)" reversible="false">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: ( BSU07840 or BSU07330 )</p>
  <p>GENE_LIST: BSU07840 BSU07330</p>
  <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C01367_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00212_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01567" name="Thymidine kinase (EC 2.7.1.21)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37060</p>
      <p>GENE_LIST: BSU37060</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00214_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00364_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01569" name="5'-nucleotidase yjjG (EC 3.1.3.5);2',3'-cyclic-nucleotide
2'-phosphodiesterase (EC 3.1.4.16)|5'-nucleotidase (EC 3.1.3.5)(BSU07840)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU07840 or BSU07330 )</p>
      <p>GENE_LIST: BSU07840 BSU07330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00364_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00214_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01570" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>

```

```

</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00214_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00672_c"/>
  <speciesReference species="M_C00178_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01577" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00216_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00309_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01582" name="D-alanine aminotransferase (EC 2.6.1.21) (D-aspartate
aminotransferase) (D-amino acid aminotransferase) (D-amino acid transaminase) (DAAT)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU09670</p>
      <p>GENE_LIST: BSU09670</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C02265_c"/>
    <speciesReference species="M_C00026_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00166_c"/>
    <speciesReference species="M_C00217_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01600" name="Glucokinase (EC 2.7.1.2)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU24850</p>
      <p>GENE_LIST: BSU24850</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00221_c"/>
  </listOfReactants>
  <listOfProducts>

```

```

    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C01172_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01624" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC
2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC
2.3.1.41)(BSU11340)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and
BSU11340 ) )</p>
      <p>GENE_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C00229_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C03939_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_R01625" name="Holo-[acyl-carrier protein] synthase (EC 2.7.8.7);Acyl
carrier protein(BSU15920)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU04620 and BSU15920 )</p>
      <p>GENE_LIST: BSU04620 BSU15920</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C03688_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_C00054_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01626" name="Malonyl CoA-acyl carrier protein transacylase (EC
2.3.1.39)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15900</p>
      <p>GENE_LIST: BSU15900</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_C00083_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>

```



```

    <speciesReference species="M_C01209_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01639" name="Xylulose kinase (EC 2.7.1.17)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU17610</p>
      <p>GENE_LIST: BSU17610</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00310_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00231_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01641" name="Transketolase (EC 2.2.1.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU17890</p>

```

```

    <p>GENE_LIST: BSU17890</p>
    <p>SUBSYSTEM: Carbohydrates</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00118_c"/>
  <speciesReference species="M_C05382_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00231_c"/>
  <speciesReference species="M_C00117_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction      id="R_R01648"      name="Gamma-aminobutyrate:alpha-ketoglutarate
aminotransferase (EC 2.6.1.19)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU03900</p>
      <p>GENE_LIST: BSU03900</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00026_c"/>
    <speciesReference species="M_C00334_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C00232_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01652" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C04236_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00233_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01654" name="Dihydrofolate synthase (EC 6.3.2.12)|Folypolyglutamate
synthase (EC 6.3.2.17)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU28080</p>
      <p>GENE_LIST: BSU28080</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C00234_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C05928_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01655" name="Methenyltetrahydrofolate cyclohydrolase (EC
3.5.4.9)|Methylenetetrahydrofolate dehydrogenase (NADP+) (EC 1.5.1.5)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU24310</p>
      <p>GENE_LIST: BSU24310</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00445_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00234_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01658" name="Geranyltranstransferase (farnesyldiphosphate synthase) (EC
2.5.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU24280</p>
      <p>GENE_LIST: BSU24280</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00129_c"/>
    <speciesReference species="M_C00235_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00341_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01663" name="Late competence protein ComEB|dCMP deaminase (EC
3.5.4.12)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25580</p>
      <p>GENE_LIST: BSU25580</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>

```

```

    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00239_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C00365_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01664" name="5'-nucleotidase yjiG (EC 3.1.3.5);2',3'-cyclic-nucleotide
2'-phosphodiesterase (EC 3.1.4.16)|5'-nucleotidase (EC 3.1.3.5)(BSU07840)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU07840 or BSU07330 )</p>
      <p>GENE_LIST: BSU07840 BSU07330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00239_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00881_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01665" name="Cytidylate kinase (EC 2.7.4.14)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22890</p>
      <p>GENE_LIST: BSU22890</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00239_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00705_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01676" name="Guanine deaminase (EC 3.5.4.3)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13170</p>
      <p>GENE_LIST: BSU13170</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00242_c"/>
  </listOfReactants>
  <listOfProducts>

```

```

    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C00385_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01678" name="Beta-galactosidase (EC 3.2.1.23)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU34130 or BSU07080 )</p>
      <p>GENE_LIST: BSU34130 BSU07080</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00243_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00267_c"/>
    <speciesReference species="M_C00124_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01688" name="Butyrate kinase (EC 2.7.2.7)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```



```

    <p>GENE_ASSOCIATION: BSU24070</p>
    <p>GENE_LIST: BSU24070</p>
    <p>SUBSYSTEM: Carbohydrates</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00246_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C02527_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01714" name="Chorismate synthase (EC 4.2.3.5)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22710</p>
      <p>GENE_LIST: BSU22710</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01269_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00251_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </kineticLaw>
</reaction>

```

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01715" name="Chorismate mutase II (EC 5.4.99.5);Chorismate mutase (EC
5.4.99.5)(BSU27910);2-keto-3-deoxy-D-arabino-heptulosonate-7-phosphate synthase I beta (EC
2.5.1.54)|Chorismate mutase I (EC 5.4.99.5)(BSU29750)" reversible="false">

<notes>
<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: ( BSU22690 or BSU27910 or BSU29750 )</p>
  <p>GENE_LIST: BSU22690 BSU27910 BSU29750</p>
  <p>SUBSYSTEM: Amino Acids and Derivatives</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00251_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00254_c"/>
</listOfProducts>
<kineticLaw>
<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01716" name="Para-aminobenzoate synthase, aminase component (EC
2.6.1.85);Anthranilate synthase, amidotransferase component (EC 4.1.3.27)|Para-aminobenzoate
synthase, amidotransferase component (EC 2.6.1.85)(BSU00750)">
<notes>
<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: ( BSU00740 and BSU00750 )</p>
  <p>GENE_LIST: BSU00740 BSU00750</p>
  <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>

```

```

    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00064_c"/>
    <speciesReference species="M_C00251_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C11355_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01717" name="Menaquinone-specific isochorismate synthase (EC
5.4.4.2);Isochorismate synthase (EC 5.4.4.2) of siderophore biosynthesis(BSU31990)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU30830 or BSU31990 )</p>
      <p>GENE_LIST: BSU30830 BSU31990</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00251_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00885_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>

```

```

        </listOfParameters>
    </kineticLaw>
</reaction>
<reaction id="R_R01724" name="Nicotinate phosphoribosyltransferase (EC 2.4.2.11)">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: BSU31750</p>
            <p>GENE_LIST: BSU31750</p>
            <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00013_c"/>
        <speciesReference species="M_C01185_c"/>
    </listOfReactants>
    <listOfProducts>
        <speciesReference species="M_C00080_c"/>
        <speciesReference species="M_C00253_c"/>
        <speciesReference species="M_C00119_c"/>
    </listOfProducts>
    <kineticLaw>
        <math xmlns="http://www.w3.org/1998/Math/MathML">
            <ci> FLUX_VALUE </ci>
        </math>
        <listOfParameters>
            <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
            <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
            <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
        </listOfParameters>
    </kineticLaw>
</reaction>
<reaction id="R_R01728" name="Prephenate dehydrogenase (EC 1.3.1.12)"
reversible="false">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: BSU22610</p>
            <p>GENE_LIST: BSU22610</p>
            <p>SUBSYSTEM: Amino Acids and Derivatives</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00003_c"/>
        <speciesReference species="M_C00254_c"/>
    </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_C00011_c"/>
  <speciesReference species="M_C01179_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01731" name="Biosynthetic Aromatic amino acid aminotransferase beta
(EC 2.6.1.57)|Histidinol-phosphate aminotransferase (EC 2.6.1.9)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22620</p>
      <p>GENE_LIST: BSU22620</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00036_c"/>
    <speciesReference species="M_C00826_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00049_c"/>
    <speciesReference species="M_C00254_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

<reaction id="R\_R01736" name="Metallo-beta-lactamase family protein, Similar to Hydroxyacylglutathione hydrolase, but in an organism lacking glutathione biosynthesis(BSU24790)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU24790 or BSU17090 )</p>

<p>GENE\_LIST: BSU24790 BSU17090</p>

<p>SUBSYSTEM: Carbohydrates</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_C03451\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00051\_c"/>

<speciesReference species="M\_C00256\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_R01737" name="Gluconokinase (EC 2.7.1.12)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU40060</p>

<p>GENE\_LIST: BSU40060</p>

<p>SUBSYSTEM: Carbohydrates</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00002\_c"/>

<speciesReference species="M\_C00257\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00008\_c"/>

```

    <speciesReference species="M_C00345_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01745" name="2-hydroxy-3-oxopropionate reductase (EC 1.1.1.60)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13960</p>
      <p>GENE_LIST: BSU13960</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00258_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C01146_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01751" name="D-malic enzyme (EC 1.1.1.83)|Tartrate decarboxylase (EC
4.1.1.73)|Tartrate dehydrogenase (EC 1.1.1.93)" reversible="false">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: BSU04000</p>
  <p>GENE_LIST: BSU04000</p>
  <p>SUBSYSTEM: Carbohydrates</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00898_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00011_c"/>
  <speciesReference species="M_C00258_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01752" name="Aldehyde dehydrogenase (EC 1.2.1.3)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU07350 or BSU37960 or BSU19310 or BSU38830 or
BSU39860 )</p>
      <p>GENE_LIST: BSU07350 BSU37960 BSU19310 BSU38830 BSU39860</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00577_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00258_c"/>
  </listOfProducts>

```



```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01758" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00532_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00259_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01761" name="L-arabinose isomerase (EC 5.3.1.4)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU28800</p>
      <p>GENE_LIST: BSU28800</p>
    </html>
  </notes>

```

<p>SUBSYSTEM: Carbohydrates</p>  
</html>  
</notes>  
<listOfReactants>  
<speciesReference species="M\_C00259\_c"/>  
</listOfReactants>  
<listOfProducts>  
<speciesReference species="M\_C00508\_c"/>  
</listOfProducts>  
<kineticLaw>  
<math xmlns="http://www.w3.org/1998/Math/MathML">  
<ci> FLUX\_VALUE </ci>  
</math>  
<listOfParameters>  
<parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
</listOfParameters>  
</kineticLaw>  
</reaction>  
<reaction id="R\_R01768" name="Xanthine dehydrogenase iron-sulfur subunit (EC 1.17.1.4);Xanthine dehydrogenase, molybdenum binding subunit (EC 1.17.1.4)(BSU32480);Xanthine dehydrogenase, FAD binding subunit (EC 1.17.1.4)(BSU32490);Probable xanthine dehydrogenase subunit A (XDHase subunit A) (EC 1.17.1.4)(BSU32510);xanthine dehydrogenase molybdenum-binding subunit(BSU32500)">  
<notes>  
<html xmlns="http://www.w3.org/1999/xhtml">  
<p>GENE\_ASSOCIATION: ( BSU32470 and BSU32480 and BSU32490 and BSU32510 and BSU32500 )</p>  
<p>GENE\_LIST: BSU32470 BSU32480 BSU32490 BSU32510 BSU32500</p>  
<p>SUBSYSTEM: Nucleosides and Nucleotides</p>  
</html>  
</notes>  
<listOfReactants>  
<speciesReference species="M\_C00003\_c"/>  
<speciesReference species="M\_C00001\_c"/>  
<speciesReference species="M\_C00262\_c"/>  
</listOfReactants>  
<listOfProducts>  
<speciesReference species="M\_C00080\_c"/>  
<speciesReference species="M\_C00004\_c"/>  
<speciesReference species="M\_C00385\_c"/>  
</listOfProducts>  
<kineticLaw>

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01771" name="Homoserine kinase (EC 2.7.1.39)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32240</p>
      <p>GENE_LIST: BSU32240</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00263_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C01102_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01773" name="Homoserine dehydrogenase (EC 1.1.1.3)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32260</p>
      <p>GENE_LIST: BSU32260</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C00263_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_C00441_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01775" name="Homoserine dehydrogenase (EC 1.1.1.3)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32260</p>
      <p>GENE_LIST: BSU32260</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00263_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C00441_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01777" name="Homoserine O-succinyltransferase (EC 2.3.1.46)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU21910</p>
      <p>GENE_LIST: BSU21910</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00263_c"/>
    <speciesReference species="M_C00091_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C01118_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01786" name="Glucokinase (EC 2.7.1.2)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU24850</p>
      <p>GENE_LIST: BSU24850</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00267_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00668_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01794" name="Dihydropteridine reductase (EC
1.5.1.34)|Oxygen-insensitive NAD(P)H nitroreductase (EC 1.-.-.)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU05660 or BSU07830 or BSU05480 or
BSU19550 )</p>
      <p>GENE_LIST: BSU05660 BSU07830 BSU05480 BSU19550</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C00268_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00272_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </kineticLaw>
  </reaction>
  <reaction id="R_R01804" name="N-acetylneuraminate synthase (EC 2.5.1.56)"
reversible="false">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU37870</p>
        <p>GENE_LIST: BSU37870</p>
        <p>SUBSYSTEM: Cell Wall and Capsule</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00001_c"/>
      <speciesReference species="M_C00645_c"/>
      <speciesReference species="M_C00074_c"/>
    </listOfReactants>
    <listOfProducts>
      <speciesReference species="M_C00009_c"/>
      <speciesReference species="M_C00080_c"/>
      <speciesReference species="M_C00270_c"/>
    </listOfProducts>
    <kineticLaw>
      <math xmlns="http://www.w3.org/1998/Math/MathML">
        <ci> FLUX_VALUE </ci>
      </math>
      <listOfParameters>
        <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
        <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
      </listOfParameters>
    </kineticLaw>
  </reaction>
  <reaction id="R_R01811" name="">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: </p>
        <p>GENE_LIST: </p>
        <p>SUBSYSTEM: Carbohydrates</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00270_c"/>
    </listOfReactants>
    <listOfProducts>

```

```

    <speciesReference species="M_C00022_c"/>
    <speciesReference species="M_C00645_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01818" name="Phosphomannomutase (EC 5.4.2.8)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU09310</p>
      <p>GENE_LIST: BSU09310</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00275_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00636_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01819" name="Mannose-6-phosphate isomerase (EC 5.3.1.8)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU12020 or BSU35790 or BSU05870 )</p>
      <p>GENE_LIST: BSU12020 BSU35790 BSU05870</p>
    </html>
  </notes>

```



```

    <p>SUBSYSTEM: Carbohydrates</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00275_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C05345_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01826" name="2-keto-3-deoxy-D-arabino-heptulosonate-7-phosphate
synthase I beta (EC 2.5.1.54)|Chorismate mutase I (EC 5.4.99.5)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU29750</p>
      <p>GENE_LIST: BSU29750</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00279_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00074_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C04691_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01827" name="Transaldolase (EC 2.2.1.2)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37110</p>
      <p>GENE_LIST: BSU37110</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00118_c"/>
    <speciesReference species="M_C05382_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C05345_c"/>
    <speciesReference species="M_C00279_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01829" name="Fructose-bisphosphate aldolase class II (EC 4.1.2.13)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37120</p>
      <p>GENE_LIST: BSU37120</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00447_c"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00279_c"/>
  <speciesReference species="M_C00111_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01830" name="Transketolase (EC 2.2.1.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU17890</p>
      <p>GENE_LIST: BSU17890</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C05345_c"/>
    <speciesReference species="M_C00118_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00231_c"/>
    <speciesReference species="M_C00279_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01843" name="6-phosphofructokinase (EC 2.7.1.11)" reversible="false">
  <notes>

```

```

    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU29190</p>
      <p>GENE_LIST: BSU29190</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C05382_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00447_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01856" name="Deoxyguanosinetriphosphate triphosphohydrolase (EC
3.1.5.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU37600 or BSU05780 )</p>
      <p>GENE_LIST: BSU37600 BSU05780</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00286_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00330_c"/>
    <speciesReference species="M_C00536_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01857" name="Nucleoside diphosphate kinase (EC 2.7.4.6)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22730</p>
      <p>GENE_LIST: BSU22730</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00361_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00286_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01859" name="Acetyl-coenzyme A carboxyl transferase alpha chain (EC
6.4.1.2)|Acetyl-coenzyme A carboxyl transferase beta chain (EC 6.4.1.2)|Propionyl-CoA
carboxylase beta chain (EC 6.4.1.3)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU23920</p>

```

<p>GENE\_LIST: BSU23920</p>  
 <p>SUBSYSTEM: Fatty Acids and Lipids</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00002\_c"/>  
 <speciesReference species="M\_C00100\_c"/>  
 <speciesReference species="M\_C00288\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00008\_c"/>  
 <speciesReference species="M\_C00009\_c"/>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00683\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_R01863" name="Purine nucleoside phosphorylase (EC 2.4.2.1)">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: ( BSU23490 or BSU19630 )</p>  
 <p>GENE\_LIST: BSU23490 BSU19630</p>  
 <p>SUBSYSTEM: Nucleosides and Nucleotides</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00009\_c"/>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00294\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00262\_c"/>  
 <speciesReference species="M\_C00620\_c"/>  
 </listOfProducts>  
 <kineticLaw>

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01867" name="Dihydroorotate dehydrogenase, catalytic subunit (EC
1.3.3.1);Dihydroorotate dehydrogenase electron transfer subunit (EC 1.3.3.1)(BSU15530)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15530 and BSU15540 )</p>
      <p>GENE_LIST: BSU15530 BSU15540</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C00337_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00027_c"/>
    <speciesReference species="M_C00295_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01870" name="Orotate phosphoribosyltransferase (EC 2.4.2.10)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15560</p>

```

<p>GENE\_LIST: BSU15560</p>  
 <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00119\_c"/>  
 <speciesReference species="M\_C00295\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00013\_c"/>  
 <speciesReference species="M\_C01103\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_R01876" name="Pyrimidine-nucleoside phosphorylase (EC 2.4.2.2)">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: BSU39400</p>  
 <p>GENE\_LIST: BSU39400</p>  
 <p>SUBSYSTEM: Nucleosides and Nucleotides</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00009\_c"/>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00299\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00620\_c"/>  
 <speciesReference species="M\_C00106\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>



```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01877" name="5'-nucleotidase yjjG (EC 3.1.3.5);2',3'-cyclic-nucleotide
2'-phosphodiesterase (EC 3.1.4.16)|5'-nucleotidase (EC 3.1.3.5)(BSU07840)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU07840 or BSU07330 )</p>
      <p>GENE_LIST: BSU07840 BSU07330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01368_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00299_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </kineticLaw>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01878" name="Cytidine deaminase (EC 3.5.4.5)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25300</p>
      <p>GENE_LIST: BSU25300</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00475_c"/>
  <speciesReference species="M_C00001_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00299_c"/>
  <speciesReference species="M_C00014_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01880" name="Uridine kinase (EC 2.7.1.48) [C1]" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27330</p>
      <p>GENE_LIST: BSU27330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00299_c"/>
    <speciesReference species="M_C00286_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00105_c"/>
    <speciesReference species="M_C00361_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

</kineticLaw>
</reaction>
<reaction id="R_R01898" name="D-lyxose isomerase (EC 5.3.1.15)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU04200</p>
      <p>GENE_LIST: BSU04200</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00310_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00476_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01899" name="Isocitrate dehydrogenase [NADP] (EC 1.1.1.42)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU29130</p>
      <p>GENE_LIST: BSU29130</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00311_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C05379_c"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01900" name="2-methylisocitrate dehydratase (EC 4.2.1.99)|Aconitate
hydratase (EC 4.2.1.3)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU18000</p>
      <p>GENE_LIST: BSU18000</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00311_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00417_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01902" name="Rhamnulokinase (EC 2.7.1.5)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU31200</p>
      <p>GENE_LIST: BSU31200</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>

```

```

</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00312_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C06441_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01920" name="Spermidine synthase (EC 2.5.1.16)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37500</p>
      <p>GENE_LIST: BSU37500</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00134_c"/>
    <speciesReference species="M_C01137_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00315_c"/>
    <speciesReference species="M_C00170_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01954" name="Argininosuccinate synthase (EC 6.3.4.5)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU29450</p>
      <p>GENE_LIST: BSU29450</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00049_c"/>
    <speciesReference species="M_C00327_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C03406_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01967" name="Deoxyadenosine kinase (EC 2.7.1.76)|Deoxyguanosine
kinase (EC 2.7.1.113)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU00140 or BSU00150 )</p>
      <p>GENE_LIST: BSU00140 BSU00150</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00330_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00362_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01968" name="5'-nucleotidase yjjG (EC 3.1.3.5);2',3'-cyclic-nucleotide
2'-phosphodiesterase (EC 3.1.4.16)|5'-nucleotidase (EC 3.1.3.5)(BSU07840)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU07840 or BSU07330 )</p>
      <p>GENE_LIST: BSU07840 BSU07330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00362_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00330_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01969" name="Purine nucleoside phosphorylase (EC 2.4.2.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU23490 or BSU19630 )</p>
      <p>GENE_LIST: BSU23490 BSU19630</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00330_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00672_c"/>
    <speciesReference species="M_C00242_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01975" name="3-hydroxyacyl-CoA dehydrogenase (EC
1.1.1.35)|Enoyl-CoA hydratase [isoleucine degradation] (EC 4.2.1.17)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32840</p>
      <p>GENE_LIST: BSU32840</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C01144_c"/>

```



```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_C00332_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R01976" name="3-hydroxyacyl-CoA dehydrogenase (EC
1.1.1.35)|3-hydroxybutyryl-CoA dehydrogenase (EC 1.1.1.157)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU24160</p>
      <p>GENE_LIST: BSU24160</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C01144_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C00332_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </kineticLaw>
  </reaction>
  <reaction id="R_R01978" name="Hydroxymethylglutaryl-CoA synthase (EC 2.3.3.10)"
reversible="false">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU17150</p>
        <p>GENE_LIST: BSU17150</p>
        <p>SUBSYSTEM: Fatty Acids and Lipids</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00332_c"/>
      <speciesReference species="M_C00024_c"/>
      <speciesReference species="M_C00001_c"/>
    </listOfReactants>
    <listOfProducts>
      <speciesReference species="M_C00080_c"/>
      <speciesReference species="M_C00010_c"/>
      <speciesReference species="M_C00356_c"/>
    </listOfProducts>
    <kineticLaw>
      <math xmlns="http://www.w3.org/1998/Math/MathML">
        <ci> FLUX_VALUE </ci>
      </math>
      <listOfParameters>
        <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
        <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
      </listOfParameters>
    </kineticLaw>
  </reaction>
  <reaction id="R_R01983" name="Uronate isomerase (EC 5.3.1.12)">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU12300</p>
        <p>GENE_LIST: BSU12300</p>
        <p>SUBSYSTEM: Carbohydrates</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00333_c"/>
    </listOfReactants>
    <listOfProducts>

```

```

    <speciesReference species="M_C00558_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01993" name="Dihydroorotase (EC 3.5.2.3)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15500</p>
      <p>GENE_LIST: BSU15500</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00337_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00438_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02003" name="Geranyltranstransferase (farnesyl diphosphate synthase) (EC
2.5.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

<p>GENE\_ASSOCIATION: BSU24280</p>  
 <p>GENE\_LIST: BSU24280</p>  
 <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00129\_c"/>  
 <speciesReference species="M\_C00341\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00013\_c"/>  
 <speciesReference species="M\_C00448\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_R02016" name="Thioredoxin reductase (EC 1.8.1.9);thioredoxin reductase (NADPH)(BSU03270)">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: ( ( BSU34790 and BSU32110 ) or ( BSU03270 and BSU32110 ) )</p>  
 <p>GENE\_LIST: BSU34790 BSU32110 BSU03270 BSU32110</p>  
 <p>SUBSYSTEM: Nucleosides and Nucleotides</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00005\_c"/>  
 <speciesReference species="M\_C00343\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00006\_c"/>  
 <speciesReference species="M\_C00342\_c"/>  
 </listOfProducts>  
 <kineticLaw>

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02017" name="Ribonucleotide reductase of class Ib (aerobic), alpha
subunit (EC 1.17.4.1);Ribonucleotide reductase of class Ib (aerobic), beta subunit (EC
1.17.4.1)(BSU17390);SPBc2 prophage-derived ribonucleoside-diphosphate reductase subunit beta
(EC 1.17.4.1) (Ribonucleotide reductase small subunit)(BSU20040);Ribonucleoside-diphosphate
reductase nrdEB subunit alpha (EC 1.17.4.1) (Ribonucleotide reductase large subunit) [Cleaved
into: Bsu nrdEB intein](BSU20060);Ribonucleotide reduction protein NrdI(BSU17370)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU17380 and BSU17390 and BSU17370 ) or
( BSU17380 and BSU17390 and BSU20040 and BSU20060 and BSU17370 ) )</p>
      <p>GENE_LIST: BSU17380 BSU17390 BSU17370 BSU17380 BSU17390 BSU20040
BSU20060 BSU17370</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00342_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00343_c"/>
    <speciesReference species="M_C00206_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>

```

```

</kineticLaw>
</reaction>
<reaction id="R_R02018" name="Ribonucleotide reductase of class Ib (aerobic), alpha
subunit (EC 1.17.4.1);Ribonucleotide reductase of class Ib (aerobic), beta subunit (EC
1.17.4.1)(BSU17390);SPBc2 prophage-derived ribonucleoside-diphosphate reductase subunit beta
(EC 1.17.4.1) (Ribonucleotide reductase small subunit)(BSU20040);Ribonucleoside-diphosphate
reductase nrdEB subunit alpha (EC 1.17.4.1) (Ribonucleotide reductase large subunit) [Cleaved
into: Bsu nrdEB intein](BSU20060);Ribonucleotide reduction protein NrdI(BSU17370)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU17380 and BSU17390 and BSU17370 ) or
( BSU17380 and BSU17390 and BSU20040 and BSU20060 and BSU17370 ) )</p>
      <p>GENE_LIST: BSU17380 BSU17390 BSU17370 BSU17380 BSU17390 BSU20040
BSU20060 BSU17370</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00015_c"/>
    <speciesReference species="M_C00342_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00343_c"/>
    <speciesReference species="M_C01346_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02019" name="Ribonucleotide reductase of class Ib (aerobic), alpha
subunit (EC 1.17.4.1);Ribonucleotide reductase of class Ib (aerobic), beta subunit (EC
1.17.4.1)(BSU17390);SPBc2 prophage-derived ribonucleoside-diphosphate reductase subunit beta
(EC 1.17.4.1) (Ribonucleotide reductase small subunit)(BSU20040);Ribonucleoside-diphosphate
reductase nrdEB subunit alpha (EC 1.17.4.1) (Ribonucleotide reductase large subunit) [Cleaved
into: Bsu nrdEB intein](BSU20060);Ribonucleotide reduction protein NrdI(BSU17370)"

```

```

reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU17380 and BSU17390 and BSU17370 ) or
( BSU17380 and BSU17390 and BSU20040 and BSU20060 and BSU17370 ) )</p>
      <p>GENE_LIST: BSU17380 BSU17390 BSU17370 BSU17380 BSU17390 BSU20040
BSU20060 BSU17370</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00035_c"/>
    <speciesReference species="M_C00342_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00343_c"/>
    <speciesReference species="M_C00361_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02021" name="Adenylyl-sulfate reductase [thioredoxin] (EC
1.8.4.10)|Phosphoadenylyl-sulfate reductase [thioredoxin] (EC 1.8.4.8)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15570 or BSU10930 )</p>
      <p>GENE_LIST: BSU15570 BSU10930</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00053_c"/>
    <speciesReference species="M_C00342_c"/>
  </listOfReactants>
  <listOfProducts>

```

```

    <speciesReference species="M_C11481_c"/>
    <speciesReference species="M_C00054_c"/>
    <speciesReference species="M_C00343_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
  <reaction id="R_R02024" name="Ribonucleotide reductase of class Ib (aerobic), alpha
subunit (EC 1.17.4.1);Ribonucleotide reductase of class Ib (aerobic), beta subunit (EC
1.17.4.1)(BSU17390);SPBc2 prophage-derived ribonucleoside-diphosphate reductase subunit beta
(EC 1.17.4.1) (Ribonucleotide reductase small subunit)(BSU20040);Ribonucleoside-diphosphate
reductase nrdEB subunit alpha (EC 1.17.4.1) (Ribonucleotide reductase large subunit) [Cleaved
into: Bsu nrdEB intein](BSU20060);Ribonucleotide reduction protein NrdI(BSU17370)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU17380 and BSU17390 and BSU17370 ) or
( BSU17380 and BSU17390 and BSU20040 and BSU20060 and BSU17370 ) )</p>
      <p>GENE_LIST: BSU17380 BSU17390 BSU17370 BSU17380 BSU17390 BSU20040
BSU20060 BSU17370</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00112_c"/>
    <speciesReference species="M_C00342_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00705_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00343_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```



```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02025" name="Peptide methionine sulfoxide reductase MsrA (EC
1.8.4.11)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU21690</p>
      <p>GENE_LIST: BSU21690</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00343_c"/>
    <speciesReference species="M_C00073_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00342_c"/>
    <speciesReference species="M_C02989_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02035" name="6-phosphogluconolactonase (EC 3.1.1.31)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13010</p>
      <p>GENE_LIST: BSU13010</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C01236_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00345_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02059" name="N-acetylglucosamine-6-phosphate deacetylase (EC
3.5.1.25)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35010</p>
      <p>GENE_LIST: BSU35010</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00357_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00033_c"/>
    <speciesReference species="M_C00352_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02060" name="Phosphoglucosamine mutase (EC 5.4.2.10)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU01770</p>
      <p>GENE_LIST: BSU01770</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C06156_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00352_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02061" name="Heptaprenyl diphosphate synthase component II (EC
2.5.1.30);Heptaprenyl diphosphate synthase component I (EC 2.5.1.30)(BSU22760)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU22740 and BSU22760 )</p>
      <p>GENE_LIST: BSU22740 BSU22760</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00448_c"/>
    <speciesReference species="M_C00129_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>

```

```

    <speciesReference species="M_C00353_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02065" name="Phytoene synthase (EC 2.5.1.32)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU10810</p>
      <p>GENE_LIST: BSU10810</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00353_c" stoichiometry="2"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C03427_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02071" name="1-phosphofructokinase (EC 2.7.1.56)|Tagatose-6-phosphate
kinase (EC 2.7.1.144)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU14390</p>

```

<p>GENE\_LIST: BSU14390</p>  
 <p>SUBSYSTEM: Carbohydrates</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00002\_c"/>  
 <speciesReference species="M\_C01094\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00008\_c"/>  
 <speciesReference species="M\_C05378\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_R02085" name="Methylglutaconyl-CoA hydratase (EC 4.2.1.18)">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: BSU18220</p>  
 <p>GENE\_LIST: BSU18220</p>  
 <p>SUBSYSTEM: Amino Acids and Derivatives</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00356\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00001\_c"/>  
 <speciesReference species="M\_C03231\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02088" name="5'-nucleotidase yjjG (EC 3.1.3.5);2',3'-cyclic-nucleotide
2'-phosphodiesterase (EC 3.1.4.16)|5'-nucleotidase (EC 3.1.3.5)(BSU07840)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU07840 or BSU07330 )</p>
      <p>GENE_LIST: BSU07840 BSU07330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00360_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00559_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02089" name="Deoxyadenosine kinase (EC 2.7.1.76)|Deoxyguanosine
kinase (EC 2.7.1.113)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU00140 or BSU00150 )</p>
      <p>GENE_LIST: BSU00140 BSU00150</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00559_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00360_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02090" name="Guanylate kinase (EC 2.7.4.8)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15680</p>
      <p>GENE_LIST: BSU15680</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00362_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00361_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_R02091" name="Uridine kinase (EC 2.7.1.48) [C1]" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27330</p>
      <p>GENE_LIST: BSU27330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00475_c"/>
    <speciesReference species="M_C00286_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00055_c"/>
    <speciesReference species="M_C00361_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02093" name="Nucleoside diphosphate kinase (EC 2.7.4.6)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22730</p>
      <p>GENE_LIST: BSU22730</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00363_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00459_c"/>
  </listOfProducts>

```



```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02094" name="Thymidylate kinase" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00280</p>
      <p>GENE_LIST: BSU00280</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00364_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00363_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02096" name="Uridine kinase (EC 2.7.1.48) [C1]" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27330</p>
      <p>GENE_LIST: BSU27330</p>

```

```

    <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00459_c"/>
  <speciesReference species="M_C00475_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00363_c"/>
  <speciesReference species="M_C00055_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02097" name="Uridine kinase (EC 2.7.1.48) [C1]" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27330</p>
      <p>GENE_LIST: BSU27330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00299_c"/>
    <speciesReference species="M_C00459_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00105_c"/>
    <speciesReference species="M_C00363_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02098" name="Thymidylate kinase" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00280</p>
      <p>GENE_LIST: BSU00280</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00365_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C01346_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02099" name="Thymidine kinase (EC 2.7.1.21)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37060</p>
      <p>GENE_LIST: BSU37060</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00526_c"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00365_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02100" name="Deoxyuridine 5'-triphosphate nucleotidohydrolase (EC
3.6.1.23)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU17660 or BSU20020 )</p>
      <p>GENE_LIST: BSU17660 BSU20020</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00460_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00365_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02101" name="Thymidylate synthase (EC 2.1.1.45)" reversible="false">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: ( BSU17680 or BSU21820 )</p>
    <p>GENE_LIST: BSU17680 BSU21820</p>
    <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00143_c"/>
  <speciesReference species="M_C00365_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00364_c"/>
  <speciesReference species="M_C00415_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02102" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00365_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00526_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02103" name="Xanthine dehydrogenase iron-sulfur subunit (EC
1.17.1.4);Xanthine dehydrogenase, molybdenum binding subunit (EC
1.17.1.4)(BSU32480);Xanthine dehydrogenase, FAD binding subunit (EC
1.17.1.4)(BSU32490);Probable xanthine dehydrogenase subunit A (XDHase subunit A) (EC
1.17.1.4)(BSU32510);xanthine dehydrogenase molybdenum-binding subunit(BSU32500)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU32470 and BSU32480 and BSU32490 and BSU32510
and BSU32500 )</p>
      <p>GENE_LIST: BSU32470 BSU32480 BSU32490 BSU32510 BSU32500</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00385_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00366_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

<reaction id="R_R02106" name="Uricase (EC 1.7.3.3)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32450</p>
      <p>GENE_LIST: BSU32450</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00366_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00027_c"/>
    <speciesReference species="M_C11821_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02133" name="Thiaminase II (EC 3.5.99.2)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU11650</p>
      <p>GENE_LIST: BSU11650</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00378_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01279_c"/>
    <speciesReference species="M_C04294_c"/>
  </listOfProducts>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02142" name="Hypoxanthine-guanine phosphoribosyltransferase (EC
2.4.2.8);Xanthine phosphoribosyltransferase (EC 2.4.2.-)(BSU22070)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU00680 or BSU22070 )</p>
      <p>GENE_LIST: BSU00680 BSU22070</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00385_c"/>
    <speciesReference species="M_C00119_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00655_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02147" name="Purine nucleoside phosphorylase (EC 2.4.2.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU23490 or BSU19630 )</p>

```



<p>GENE\_LIST: BSU23490 BSU19630</p>  
 <p>SUBSYSTEM: Nucleosides and Nucleotides</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00009\_c"/>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00387\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00242\_c"/>  
 <speciesReference species="M\_C00620\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_R02148" name="5'-nucleotidase yjjG (EC 3.1.3.5);2',3'-cyclic-nucleotide  
 2'-phosphodiesterase (EC 3.1.4.16)|5'-nucleotidase (EC 3.1.3.5)(BSU07840)" reversible="false">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: ( BSU07840 or BSU07330 )</p>  
 <p>GENE\_LIST: BSU07840 BSU07330</p>  
 <p>SUBSYSTEM: Nucleosides and Nucleotides</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00001\_c"/>  
 <speciesReference species="M\_C06193\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00009\_c"/>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00387\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02156" name="Quercetin 2,3-dioxygenase (EC 1.13.11.24)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU39980</p>
      <p>GENE_LIST: BSU39980</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C00389_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00237_c"/>
    <speciesReference species="M_C04524_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02196" name="Leucine dehydrogenase (EC 1.4.1.9)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU24080</p>
      <p>GENE_LIST: BSU24080</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00407_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_C00014_c"/>
  <speciesReference species="M_C00671_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02199" name="Branched-chain amino acid aminotransferase (EC
2.6.1.42)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU02390 or BSU38550 )</p>
      <p>GENE_LIST: BSU02390 BSU38550</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00026_c"/>
    <speciesReference species="M_C00407_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C00671_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02236" name="Dihydrofolate reductase (EC 1.5.1.3)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU21810</p>
      <p>GENE_LIST: BSU21810</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00415_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C00504_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02237" name="Dihydrofolate synthase (EC 6.3.2.12)|Folylpolyglutamate
synthase (EC 6.3.2.17)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU28080</p>
      <p>GENE_LIST: BSU28080</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00025_c"/>
  <speciesReference species="M_C00921_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00415_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02263" name="Predicted lactaldehyde dehydrogenase (EC
1.2.1.22)|Predicted rhamnulose-1-phosphate aldolase (EC 4.1.2.19)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU31220</p>
      <p>GENE_LIST: BSU31220</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01131_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00111_c"/>
    <speciesReference species="M_C00424_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02272" name="Glutamate-1-semialdehyde aminotransferase (EC 5.4.3.8)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU28120 or BSU08710 )</p>
      <p>GENE_LIST: BSU28120 BSU08710</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00430_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C03741_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02279" name="5-dehydro-4-deoxyglucarate dehydratase (EC 4.2.1.41)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02460</p>
      <p>GENE_LIST: BSU02460</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00679_c"/>
  </listOfReactants>
  <listOfProducts>

```

```

    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00433_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02282" name="Glutamate N-acetyltransferase (EC
2.3.1.35)|N-acetylglutamate synthase (EC 2.3.1.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU11200</p>
      <p>GENE_LIST: BSU11200</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C00437_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00077_c"/>
    <speciesReference species="M_C00624_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02283" name="Acetylornithine aminotransferase (EC 2.6.1.11)">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: BSU11220</p>
    <p>GENE_LIST: BSU11220</p>
    <p>SUBSYSTEM: Amino Acids and Derivatives</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00026_c"/>
  <speciesReference species="M_C00437_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00025_c"/>
  <speciesReference species="M_C01250_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02285" name="Formiminoglutamase (EC 3.5.3.8)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU39380</p>
      <p>GENE_LIST: BSU39380</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C00488_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00439_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```



```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02288" name="Imidazolonepropionase (EC 3.5.2.7)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU39370</p>
      <p>GENE_LIST: BSU39370</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C03680_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00439_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02291" name="Aspartate-semialdehyde dehydrogenase (EC 1.2.1.11)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16750</p>
      <p>GENE_LIST: BSU16750</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00005_c"/>
  <speciesReference species="M_C03082_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00006_c"/>
  <speciesReference species="M_C00441_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02292" name="Dihydrodipicolinate synthase (EC 4.2.1.52)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16770</p>
      <p>GENE_LIST: BSU16770</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00022_c"/>
    <speciesReference species="M_C00441_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00001_c" stoichiometry="2"/>
    <speciesReference species="M_C03340_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02294" name="Purine nucleoside phosphorylase (EC 2.4.2.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU23490 or BSU19630 )</p>
      <p>GENE_LIST: BSU23490 BSU19630</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C03150_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00620_c"/>
    <speciesReference species="M_C00153_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02295" name="Purine nucleoside phosphorylase (EC 2.4.2.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU23490 or BSU19630 )</p>
      <p>GENE_LIST: BSU23490 BSU19630</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C05841_c"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00253_c"/>
  <speciesReference species="M_C00620_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02296" name="Pyrimidine-nucleoside phosphorylase (EC 2.4.2.2)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU39400</p>
      <p>GENE_LIST: BSU39400</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00475_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00620_c"/>
    <speciesReference species="M_C00380_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02297" name="Purine nucleoside phosphorylase (EC 2.4.2.1)">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: ( BSU23490 or BSU19630 )</p>
    <p>GENE_LIST: BSU23490 BSU19630</p>
    <p>SUBSYSTEM: Carbohydrates</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C01762_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00385_c"/>
  <speciesReference species="M_C00620_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02301" name="5-formyltetrahydrofolate cyclo-ligase (EC 6.3.3.2)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU24890</p>
      <p>GENE_LIST: BSU24890</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C03479_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00445_c"/>
  </listOfProducts>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02317" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C04076_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00450_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02323" name="5'-nucleotidase yjjG (EC 3.1.3.5);2',3'-cyclic-nucleotide
2'-phosphodiesterase (EC 3.1.4.16)|5'-nucleotidase (EC 3.1.3.5)(BSU07840)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU07840 or BSU07330 )</p>
    </html>
  </notes>

```

```

    <p>GENE_LIST: BSU07840 BSU07330</p>
    <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00455_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C03150_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02326" name="Nucleoside diphosphate kinase (EC 2.7.4.6)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22730</p>
      <p>GENE_LIST: BSU22730</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00705_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00458_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02327" name="Uridine kinase (EC 2.7.1.48) [C1]" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27330</p>
      <p>GENE_LIST: BSU27330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00299_c"/>
    <speciesReference species="M_C00458_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00105_c"/>
    <speciesReference species="M_C00705_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02328" name="Glucose-1-phosphate thymidyltransferase (EC 2.7.7.24)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37840</p>
      <p>GENE_LIST: BSU37840</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>

```



```

    <speciesReference species="M_C00103_c"/>
    <speciesReference species="M_C00459_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00842_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02331" name="Nucleoside diphosphate kinase (EC 2.7.4.6)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22730</p>
      <p>GENE_LIST: BSU22730</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C01346_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00460_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>

```

```

</kineticLaw>
</reaction>
<reaction id="R_R02332" name="Uridine kinase (EC 2.7.1.48) [C1]" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27330</p>
      <p>GENE_LIST: BSU27330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00299_c"/>
    <speciesReference species="M_C00460_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00105_c"/>
    <speciesReference species="M_C01346_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02340" name="Tryptophan synthase alpha chain (EC 4.2.1.20);Tryptophan
synthase beta chain (EC 4.2.1.20)(BSU22640)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU22630 and BSU22640 )</p>
      <p>GENE_LIST: BSU22630 BSU22640</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C03506_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00118_c"/>
    <speciesReference species="M_C00463_c"/>
  </listOfProducts>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02370" name="5'-nucleotidase yjjG (EC 3.1.3.5);2',3'-cyclic-nucleotide
2'-phosphodiesterase (EC 3.1.4.16)|5'-nucleotidase (EC 3.1.3.5)(BSU07840)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU07840 or BSU07330 )</p>
      <p>GENE_LIST: BSU07840 BSU07330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C05822_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00475_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02371" name="Uridine kinase (EC 2.7.1.48) [C1]" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

```

    <p>GENE_ASSOCIATION: BSU27330</p>
    <p>GENE_LIST: BSU27330</p>
    <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00458_c"/>
  <speciesReference species="M_C00475_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00705_c"/>
  <speciesReference species="M_C00055_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02372" name="Uridine kinase (EC 2.7.1.48) [C1]" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27330</p>
      <p>GENE_LIST: BSU27330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00475_c"/>
    <speciesReference species="M_C00460_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00055_c"/>
    <speciesReference species="M_C01346_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02410" name="Sucrose-6-phosphate hydrolase (EC 3.2.1.26)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU38040</p>
      <p>GENE_LIST: BSU38040</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00492_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00095_c"/>
    <speciesReference species="M_C05402_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02412" name="Shikimate kinase I (EC 2.7.1.71)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU03150</p>
      <p>GENE_LIST: BSU03150</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>

```

```

    <speciesReference species="M_C00493_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C03175_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02413" name="Shikimate 5-dehydrogenase I alpha (EC 1.1.1.25)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25660</p>
      <p>GENE_LIST: BSU25660</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00493_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C02637_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_R02423" name="Allantoate amidohydrolase (EC 3.5.3.9)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32530</p>
      <p>GENE_LIST: BSU32530</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00499_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C02091_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02425" name="Allantoinase (EC 3.5.2.5)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32410</p>
      <p>GENE_LIST: BSU32410</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C02350_c"/>
  </listOfReactants>
  <listOfProducts>

```

```

    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00499_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02426" name="Similar to CDP-glucose 4,6-dehydratase (EC 4.2.1.45)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU07280</p>
      <p>GENE_LIST: BSU07280</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00501_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01219_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02437" name="L-rhamnose isomerase (EC 5.3.1.14)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```



```

    <p>GENE_ASSOCIATION: BSU31180</p>
    <p>GENE_LIST: BSU31180</p>
    <p>SUBSYSTEM: Carbohydrates</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00507_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00861_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02439" name="Ribulokinase (EC 2.7.1.16)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU28790</p>
      <p>GENE_LIST: BSU28790</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00508_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C01101_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02454" name="D-mannonate oxidoreductase (EC 1.1.1.57)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU12350</p>
      <p>GENE_LIST: BSU12350</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00514_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00905_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02472" name="2-dehydropantoate 2-reductase (EC 1.1.1.169)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15110 or BSU14440 )</p>
      <p>GENE_LIST: BSU15110 BSU14440</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00522_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00005_c"/>
  <speciesReference species="M_C00966_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02473" name="Pantoate--beta-alanine ligase (EC 6.3.2.1)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22420</p>
      <p>GENE_LIST: BSU22420</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00099_c"/>
    <speciesReference species="M_C00522_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00864_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02484" name="Purine nucleoside phosphorylase (EC 2.4.2.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU23490 or BSU19630 )</p>
      <p>GENE_LIST: BSU23490 BSU19630</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00526_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00672_c"/>
    <speciesReference species="M_C00106_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02485" name="Cytidine deaminase (EC 3.5.4.5)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25300</p>
      <p>GENE_LIST: BSU25300</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00881_c"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00014_c"/>
  <speciesReference species="M_C00526_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02504" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C02466_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00536_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02513" name="NG,NG-dimethylarginine dimethylaminohydrolase 1 (EC
3.5.3.18)" reversible="false">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: BSU13020</p>
    <p>GENE_LIST: BSU13020</p>
    <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C03626_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00327_c"/>
  <speciesReference species="M_C00543_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02530" name="Possible glyoxylase family protein (Lactoylglutathione
lyase) (EC 4.4.1.5);Glyoxalase family protein(BSU07160);Lactoylglutathione lyase and related
lyases(BSU23930);Lactoylglutathione lyase and related lyases(BSU26940);Lactoylglutathione
lyase and related lyases(BSU32660);Lactoylglutathione lyase and related lyases(BSU38370)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU07160 or BSU38370 or BSU40860 or BSU23930 or
BSU26940 or BSU32660 )</p>
      <p>GENE_LIST:  BSU07160  BSU38370  BSU40860  BSU23930  BSU26940
BSU32660</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C03451_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00051_c"/>

```

```

    <speciesReference species="M_C00546_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02540" name="Aliphatic amidase amiE (EC 3.5.1.4)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13570</p>
      <p>GENE_LIST: BSU13570</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C02505_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C07086_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02545" name="D-malic enzyme (EC 1.1.1.83)|Tartrate decarboxylase (EC
4.1.1.73)|Tartrate dehydrogenase (EC 1.1.1.93)">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: BSU04000</p>
  <p>GENE_LIST: BSU04000</p>
  <p>SUBSYSTEM: Carbohydrates</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C00552_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_C03459_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02549" name="Aldehyde dehydrogenase (EC 1.2.1.3)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU07350 or BSU37960 or BSU39860 or BSU38830 or
BSU19310 )</p>
      <p>GENE_LIST: BSU07350 BSU37960 BSU39860 BSU38830 BSU19310</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00555_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00334_c"/>
  </listOfProducts>
</reaction>

```



```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02555" name="Altronate oxidoreductase (EC 1.1.1.58)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU12380</p>
      <p>GENE_LIST: BSU12380</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00817_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00558_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02557" name="Purine nucleoside phosphorylase (EC 2.4.2.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU23490 or BSU19630 )</p>
    </html>
  </notes>

```

<p>GENE\_LIST: BSU23490 BSU19630</p>  
 <p>SUBSYSTEM: Nucleosides and Nucleotides</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00009\_c"/>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00559\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00672\_c"/>  
 <speciesReference species="M\_C00147\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_R02565" name="Betaine aldehyde dehydrogenase (EC 1.2.1.8)">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: BSU31060</p>  
 <p>GENE\_LIST: BSU31060</p>  
 <p>SUBSYSTEM: Amino Acids and Derivatives</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00003\_c"/>  
 <speciesReference species="M\_C00001\_c"/>  
 <speciesReference species="M\_C00576\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00080\_c" stoichiometry="2"/>  
 <speciesReference species="M\_C00004\_c"/>  
 <speciesReference species="M\_C00719\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02566" name="Betaine aldehyde dehydrogenase (EC 1.2.1.8)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU31060</p>
      <p>GENE_LIST: BSU31060</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00576_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C00719_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02568" name="Fructose-bisphosphate aldolase class II (EC 4.1.2.13)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37120</p>
      <p>GENE_LIST: BSU37120</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>

```

```

    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01094_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00111_c"/>
    <speciesReference species="M_C00577_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02569" name="Dihydrolipoamide acetyltransferase component of pyruvate
dehydrogenase complex (EC 2.3.1.12)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU14600</p>
      <p>GENE_LIST: BSU14600</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C15973_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C16255_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02570" name="Dihydrolipoamide succinyltransferase component (E2) of
2-oxoglutarate dehydrogenase complex (EC 2.3.1.61)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU19360</p>
      <p>GENE_LIST: BSU19360</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00091_c"/>
    <speciesReference species="M_C15973_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C16254_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02613" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C05332_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00014_c"/>
  <speciesReference species="M_C00027_c"/>
  <speciesReference species="M_C00601_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02630" name="PTS system, mannitol-specific IIA component (EC
2.7.1.69)|PTS system, mannitol-specific IIB component (EC 2.7.1.69)|PTS system,
mannitol-specific IIC component (EC 2.7.1.69);Phosphoenolpyruvate-protein phosphotransferase
of PTS system (EC 2.7.3.9)(BSU13910);PTS system, mannose-specific IIA component (EC
2.7.1.69)|PTS system, mannose-specific IIB component (EC 2.7.1.69)|PTS system,
mannose-specific IIC component (EC 2.7.1.69)(BSU12010)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU12010</p>
      <p>GENE_LIST: BSU12010</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C04261_c"/>
    <speciesReference species="M_C00159_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00615_c"/>
    <speciesReference species="M_C00275_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02649" name="Acetylglutamate kinase (EC 2.7.2.8)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU11210</p>
      <p>GENE_LIST: BSU11210</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00624_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C04133_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02662" name="Dihydrolipoamide acyltransferase component of
branched-chain alpha-keto acid dehydrogenase complex (EC 2.3.1.168)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU24030</p>
      <p>GENE_LIST: BSU24030</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00630_c"/>

```

```

    <speciesReference species="M_C15973_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C15977_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02698" name="4-hydroxyphenylacetate 3-monooxygenase (EC 1.14.13.3)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU18620</p>
      <p>GENE_LIST: BSU18620</p>
      <p>SUBSYSTEM: Metabolism of Aromatic Compounds</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C00642_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01161_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```



```

        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02703" name="Mannitol-1-phosphate 5-dehydrogenase (EC 1.1.1.17)">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: BSU03990</p>
            <p>GENE_LIST: BSU03990</p>
            <p>SUBSYSTEM: Carbohydrates</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00003_c"/>
        <speciesReference species="M_C00644_c"/>
    </listOfReactants>
    <listOfProducts>
        <speciesReference species="M_C00080_c"/>
        <speciesReference species="M_C00004_c"/>
        <speciesReference species="M_C05345_c"/>
    </listOfProducts>
    <kineticLaw>
        <math xmlns="http://www.w3.org/1998/Math/MathML">
            <ci> FLUX_VALUE </ci>
        </math>
        <listOfParameters>
            <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
            <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
            <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
        </listOfParameters>
    </kineticLaw>
</reaction>
<reaction id="R_R02719" name="5'-nucleotidase yjjG (EC 3.1.3.5);2',3'-cyclic-nucleotide
2'-phosphodiesterase (EC 3.1.4.16)|5'-nucleotidase (EC 3.1.3.5)(BSU07840)" reversible="false">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: ( BSU07840 or BSU07330 )</p>
            <p>GENE_LIST: BSU07840 BSU07330</p>
            <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00001_c"/>
        <speciesReference species="M_C00655_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C01762_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02722" name="Tryptophan synthase alpha chain (EC 4.2.1.20);Tryptophan
synthase beta chain (EC 4.2.1.20)(BSU22640)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU22630 and BSU22640 )</p>
      <p>GENE_LIST: BSU22630 BSU22640</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00065_c"/>
    <speciesReference species="M_C03506_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00118_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00078_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

</kineticLaw>
</reaction>
<reaction id="R_R02727" name="Maltose phosphorylase (EC 2.4.1.8)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU34570</p>
      <p>GENE_LIST: BSU34570</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01083_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00267_c"/>
    <speciesReference species="M_C00663_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02728" name="Beta-phosphoglucomutase (EC 5.4.2.6)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU34550</p>
      <p>GENE_LIST: BSU34550</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00663_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C01172_c"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02733" name="N-acetyl-L,L-diaminopimelate deacetylase (EC 3.5.1.47)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU14190</p>
      <p>GENE_LIST: BSU14190</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C04390_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00033_c"/>
    <speciesReference species="M_C00666_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction
          id="R_R02734"
          name="succinyl-diaminopimelate
desuccinylase;N-acetyl-L,L-diaminopimelate
deacetylase      homolog      (EC
3.5.1.18)(BSU29290);N-acetyl-L,L-diaminopimelate
deacetylase      homolog      (EC
3.5.1.18)(BSU39470)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

<p>GENE\_ASSOCIATION: ( BSU29980 or BSU29290 or BSU39470 )</p>  
 <p>GENE\_LIST: BSU29980 BSU29290 BSU39470</p>  
 <p>SUBSYSTEM: Amino Acids and Derivatives</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00001\_c"/>  
 <speciesReference species="M\_C04421\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00042\_c"/>  
 <speciesReference species="M\_C00666\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_R02735" name="Diaminopimelate epimerase (EC 5.1.1.7)">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: BSU32170</p>  
 <p>GENE\_LIST: BSU32170</p>  
 <p>SUBSYSTEM: Amino Acids and Derivatives</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00666\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00680\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02736" name="Glucose-6-phosphate 1-dehydrogenase (EC 1.1.1.49)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU23850</p>
      <p>GENE_LIST: BSU23850</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01172_c"/>
    <speciesReference species="M_C00006_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C01236_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C00080_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02739" name="Glucose-6-phosphate isomerase (EC 5.3.1.9)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU31350</p>
      <p>GENE_LIST: BSU31350</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00668_c"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C01172_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02740" name="Glucose-6-phosphate isomerase (EC 5.3.1.9)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU31350</p>
      <p>GENE_LIST: BSU31350</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00668_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C05345_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02748" name="Purine nucleoside phosphorylase (EC 2.4.2.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU23490 or BSU19630 )</p>
      <p>GENE_LIST: BSU23490 BSU19630</p>
    </html>
  </notes>

```

```

    <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C05512_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00262_c"/>
  <speciesReference species="M_C00672_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02749" name="Phosphopentomutase (EC 5.4.2.7)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU23500</p>
      <p>GENE_LIST: BSU23500</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00672_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00673_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```



```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02750" name="Ribokinase (EC 2.7.1.15)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35920</p>
      <p>GENE_LIST: BSU35920</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C01801_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00673_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02752" name="Glucarate dehydratase (EC 4.2.1.40)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02490</p>
      <p>GENE_LIST: BSU02490</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00818_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
  </listOfProducts>

```

```

    <speciesReference species="M_C00679_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02777" name="dTDP-4-dehydrorhamnose reductase">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37820</p>
      <p>GENE_LIST: BSU37820</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C03319_c"/>
    <speciesReference species="M_C00006_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00688_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C00080_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02782" name="Inosose dehydratase (EC 4.2.1.44)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

<p>GENE\_ASSOCIATION: BSU39720</p>  
 <p>GENE\_LIST: BSU39720</p>  
 <p>SUBSYSTEM: Carbohydrates</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00691\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00001\_c"/>  
 <speciesReference species="M\_C04287\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_R02783" name="UDP-N-acetylmuramoylalanine--D-glutamate ligase (EC 6.3.2.9)" reversible="false">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: BSU15200</p>  
 <p>GENE\_LIST: BSU15200</p>  
 <p>SUBSYSTEM: Cell Wall and Capsule</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00002\_c"/>  
 <speciesReference species="M\_C00217\_c"/>  
 <speciesReference species="M\_C01212\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00008\_c"/>  
 <speciesReference species="M\_C00009\_c"/>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00692\_c"/>  
 </listOfProducts>  
 <kineticLaw>

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02788"
name="UDP-N-acetylmuramoylalanyl-D-glutamate--2,6-diaminopimelate ligase (EC 6.3.2.13)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15180</p>
      <p>GENE_LIST: BSU15180</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00680_c"/>
    <speciesReference species="M_C00692_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C04877_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02853" name="Phosphoserine phosphatase rsbX (EC 3.1.3.3)"
reversible="false">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: BSU04740</p>
    <p>GENE_LIST: BSU04740</p>
    <p>SUBSYSTEM: Amino Acids and Derivatives</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C02532_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00740_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02864" name="Sirohydrochlorin ferrochelatase (EC 4.99.1.4)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15620</p>
      <p>GENE_LIST: BSU15620</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00748_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C05778_c"/>
    <speciesReference species="M_C14818_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02869" name="Spermidine synthase (EC 2.5.1.16)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37500</p>
      <p>GENE_LIST: BSU37500</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00315_c"/>
    <speciesReference species="M_C01137_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00170_c"/>
    <speciesReference species="M_C00750_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02914" name="Urocanate hydratase (EC 4.2.1.49)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU39360</p>
      <p>GENE_LIST: BSU39360</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>

```

```

</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C03680_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00785_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02918" name="Tyrosyl-tRNA synthetase (EC 6.1.1.1);tyrosyl-tRNA
synthetase(BSU38460)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU29670 or BSU38460 )</p>
      <p>GENE_LIST: BSU29670 BSU38460</p>
      <p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00082_c"/>
    <speciesReference species="M_C00787_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C02839_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R02946" name="2,3-butanediol dehydrogenase, R-alcohol forming, (R)- and
(S)-acetoin-specific (EC 1.1.1.4)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU06240</p>
      <p>GENE_LIST: BSU06240</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C03044_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00810_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02947" name="Alpha-acetolactate decarboxylase (EC 4.1.1.5)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36000</p>
      <p>GENE_LIST: BSU36000</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>

```



```

<listOfReactants>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00900_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00011_c"/>
  <speciesReference species="M_C00810_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03005" name="Nicotinate-nucleotide adenylyltransferase (EC 2.7.7.18)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25640</p>
      <p>GENE_LIST: BSU25640</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C01185_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00857_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03012" name="Histidinol dehydrogenase (EC 1.1.1.23)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU34910</p>
      <p>GENE_LIST: BSU34910</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00860_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C01929_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03013" name="Histidinol-phosphatase (EC 3.1.3.15)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU29620</p>
      <p>GENE_LIST: BSU29620</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01100_c"/>
  </listOfReactants>
  <listOfProducts>

```

```

    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00860_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03014" name="Rhamnulokinase (EC 2.7.1.5)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU31200</p>
      <p>GENE_LIST: BSU31200</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00861_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C01131_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03018" name="Pantothenate kinase type III, CoaX-like (EC
2.7.1.33);Pantothenate kinase (EC 2.7.1.33)(BSU23760)" reversible="false">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: ( BSU23760 or BSU00700 )</p>
    <p>GENE_LIST: BSU23760 BSU00700</p>
    <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00864_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C03492_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03024" name="Alkaline phosphatase (EC 3.1.3.1)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU05740</p>
      <p>GENE_LIST: BSU05740</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C03360_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00870_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03026" name="Enoyl-CoA hydratase (EC 4.2.1.17);enoyl-CoA
hydratase(BSU17160);enoyl-CoA hydratase(BSU09880)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU28540 or BSU17160 or BSU09880 or
BSU17170 )</p>
      <p>GENE_LIST: BSU28540 BSU17160 BSU09880 BSU17170</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01144_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00877_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03035" name="Phosphopantetheine adenylyltransferase (EC 2.7.7.3)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15020</p>
      <p>GENE_LIST: BSU15020</p>
    </html>
  </notes>

```

```

    <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C01134_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00013_c"/>
  <speciesReference species="M_C00882_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03037" name="Isochorismatase (EC 3.3.2.1) of siderophore
biosynthesis:Isochorismatase (EC 3.3.2.1)(BSU05070)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU31970 or BSU05070 )</p>
      <p>GENE_LIST: BSU31970 BSU05070</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00885_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00022_c"/>
    <speciesReference species="M_C04171_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03038" name="Alanyl-tRNA synthetase (EC 6.1.1.7)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27410</p>
      <p>GENE_LIST: BSU27410</p>
      <p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00041_c"/>
    <speciesReference species="M_C01635_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00886_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03050" name="Acetolactate synthase small subunit (EC 2.2.1.6);Acetolactate synthase large subunit (EC 2.2.1.6)(BSU28310);Acetolactate synthase, catabolic (EC 2.2.1.6)(BSU36010)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU28300 and BSU28310 ) or BSU36010 )</p>
      <p>GENE_LIST: BSU28300 BSU28310 BSU36010</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00068_c"/>
  <speciesReference species="M_C00900_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C05125_c"/>
  <speciesReference species="M_C00022_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03051" name="Ketol-acid reductoisomerase (EC 1.1.1.86)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU28290</p>
      <p>GENE_LIST: BSU28290</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C00900_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C04039_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>

```



```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03062" name="cephalosporin C deacetylase">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU03180</p>
      <p>GENE_LIST: BSU03180</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00916_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00033_c"/>
    <speciesReference species="M_C03112_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03066" name="Dihydropteroate synthase (EC 2.5.1.15)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00770</p>
      <p>GENE_LIST: BSU00770</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00568_c"/>
    <speciesReference species="M_C01300_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00921_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03067" name="Dihydropteroate synthase (EC 2.5.1.15)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00770</p>
      <p>GENE_LIST: BSU00770</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00568_c"/>
    <speciesReference species="M_C04807_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00921_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

<reaction id="R\_R03083" name="3-dehydroquinate synthase (EC 4.2.3.4)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU22700</p>

<p>GENE\_LIST: BSU22700</p>

<p>SUBSYSTEM: Amino Acids and Derivatives</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C04691\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00009\_c"/>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00944\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_R03084" name="3-dehydroquinate dehydratase I (EC 4.2.1.10);3-dehydroquinate dehydratase II (EC 4.2.1.10)(BSU24470)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU23080 or BSU24470 )</p>

<p>GENE\_LIST: BSU23080 BSU24470</p>

<p>SUBSYSTEM: Amino Acids and Derivatives</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00944\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_C02637\_c"/>

</listOfProducts>

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03096" name="Aliphatic amidase amiE (EC 3.5.1.4)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13570</p>
      <p>GENE_LIST: BSU13570</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C02693_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C00954_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03165" name="Uroporphyrinogen-III synthase (EC
4.2.1.75);Uroporphyrinogen-III methyltransferase (EC 2.1.1.107)|Uroporphyrinogen-III synthase
(EC 4.2.1.75)(BSU03280);uroporphyrinogen-III synthase;porphobilinogenase;uoporphyrinogen
isomerase;uoporphyrinogen III cosynthase;URO-synthase;hydroxymethylbilane hydro-lyase
(cyclizing)(BSU12230)">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: ( BSU28140 or BSU03280 or BSU12230 )</p>
  <p>GENE_LIST: BSU28140 BSU03280 BSU12230</p>
  <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C01024_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C01051_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03172" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00016_c"/>
    <speciesReference species="M_C15980_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C01352_c"/>
    <speciesReference species="M_C03345_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03174" name="Dihydrolipoamide acyltransferase component of
branched-chain alpha-keto acid dehydrogenase complex (EC 2.3.1.168)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU24030</p>
      <p>GENE_LIST: BSU24030</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C15973_c"/>
    <speciesReference species="M_C15980_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C15979_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03180" name="Aliphatic amidase amiE (EC 3.5.1.4)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13570</p>
      <p>GENE_LIST: BSU13570</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C03078_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C01035_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03182" name="Dethiobiotin synthetase (EC 6.3.3.3)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30210</p>
      <p>GENE_LIST: BSU30210</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C01037_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c" stoichiometry="3"/>
    <speciesReference species="M_C01909_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```

```

        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03192" name="UDP-N-acetylenolpyruvoylglucosamine reductase (EC
1.1.1.158)" reversible="false">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: BSU15230</p>
            <p>GENE_LIST: BSU15230</p>
            <p>SUBSYSTEM: Cell Wall and Capsule</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00080_c"/>
        <speciesReference species="M_C00005_c"/>
        <speciesReference species="M_C04631_c"/>
    </listOfReactants>
    <listOfProducts>
        <speciesReference species="M_C00006_c"/>
        <speciesReference species="M_C01050_c"/>
    </listOfProducts>
    <kineticLaw>
        <math xmlns="http://www.w3.org/1998/Math/MathML">
            <ci> FLUX_VALUE </ci>
        </math>
        <listOfParameters>
            <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
            <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
            <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
        </listOfParameters>
    </kineticLaw>
</reaction>
<reaction id="R_R03193" name="UDP-N-acetylmuramate--alanine ligase (EC 6.3.2.8)"
reversible="false">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: BSU29790</p>
            <p>GENE_LIST: BSU29790</p>
            <p>SUBSYSTEM: Cell Wall and Capsule</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00002_c"/>

```



```

    <speciesReference species="M_C00041_c"/>
    <speciesReference species="M_C01050_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01212_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03194" name="Uroporphyrinogen-III methyltransferase (EC
2.1.1.107);Uroporphyrinogen-III methyltransferase (EC 2.1.1.107)|Uroporphyrinogen-III synthase
(EC 4.2.1.75)(BSU03280)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU03280 or BSU15610 )</p>
      <p>GENE_LIST: BSU03280 BSU15610</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01051_c"/>
    <speciesReference species="M_C00019_c" stoichiometry="2"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00021_c" stoichiometry="2"/>
    <speciesReference species="M_C02463_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03197" name="Uroporphyrinogen III decarboxylase (EC 4.1.1.37)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU10120</p>
      <p>GENE_LIST: BSU10120</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="4"/>
    <speciesReference species="M_C01051_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c" stoichiometry="4"/>
    <speciesReference species="M_C03263_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03209" name="Pimeloyl-CoA synthase (EC 6.2.1.14)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30240</p>
      <p>GENE_LIST: BSU30240</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>

```

```

    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C02656_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C01063_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03210" name="8-amino-7-oxononanoate synthase (EC 2.3.1.47)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30220</p>
      <p>GENE_LIST: BSU30220</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00041_c"/>
    <speciesReference species="M_C01063_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C01092_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03222" name="Protoporphyrinogen IX oxidase, aerobic (EC 1.3.3.4)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU10140</p>
      <p>GENE_LIST: BSU10140</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00007_c" stoichiometry="3"/>
    <speciesReference species="M_C01079_c" stoichiometry="2"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c" stoichiometry="6"/>
    <speciesReference species="M_C02191_c" stoichiometry="2"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03223" name="Thiamin-phosphate pyrophosphorylase (EC
2.5.1.3);Thiamin biosynthesis protein ThiC(BSU08790)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU38290 or BSU11660 or BSU08790 )</p>
      <p>GENE_LIST: BSU38290 BSU11660 BSU08790</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C04327_c"/>

```

```

    <speciesReference species="M_C04752_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C01081_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction      id="R_R03231"      name="Adenosylmethionine-8-amino-7-oxononanoate
aminotransferase (EC 2.6.1.62)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30230</p>
      <p>GENE_LIST: BSU30230</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01092_c"/>
    <speciesReference species="M_C00019_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C01037_c"/>
    <speciesReference species="M_C04425_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_R03236" name="1-phosphofructokinase (EC 2.7.1.56)|Tagatose-6-phosphate
kinase (EC 2.7.1.144);6-phosphofructokinase (EC 2.7.1.11)(BSU29190)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU29190 or BSU14390 )</p>
      <p>GENE_LIST: BSU29190 BSU14390</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C01097_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C03785_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03243" name="Biosynthetic Aromatic amino acid aminotransferase beta
(EC 2.6.1.57)|Histidinol-phosphate aminotransferase (EC 2.6.1.9)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22620</p>
      <p>GENE_LIST: BSU22620</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00026_c"/>
    <speciesReference species="M_C01100_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00025_c"/>

```

```

    <speciesReference species="M_C01267_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03260" name="Cystathionine gamma-synthase (EC 2.5.1.48)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU11870</p>
      <p>GENE_LIST: BSU11870</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00042_c"/>
    <speciesReference species="M_C02291_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00097_c"/>
    <speciesReference species="M_C01118_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03269" name="Phosphopantothenoylecysteine decarboxylase (EC
4.1.1.36)|Phosphopantothenoylecysteine synthetase (EC 6.3.2.5)" reversible="false">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: BSU15700</p>
  <p>GENE_LIST: BSU15700</p>
  <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C04352_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00011_c"/>
  <speciesReference species="M_C01134_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03270" name="Pyruvate dehydrogenase E1 component alpha subunit (EC
1.2.4.1);Pyruvate dehydrogenase E1 component beta subunit (EC 1.2.4.1)(BSU14590)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU14580 and BSU14590 )</p>
      <p>GENE_LIST: BSU14580 BSU14590</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C05125_c"/>
    <speciesReference species="M_C15972_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00068_c"/>
    <speciesReference species="M_C16255_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```



```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03299" name="4-hydroxyphenylacetate 3-monooxygenase (EC 1.14.13.3)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU18620</p>
      <p>GENE_LIST: BSU18620</p>
      <p>SUBSYSTEM: Metabolism of Aromatic Compounds</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C05593_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01161_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03313" name="Gamma-glutamyl phosphate reductase (EC 1.2.1.41)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

```

    <p>GENE_ASSOCIATION: BSU13130</p>
    <p>GENE_LIST: BSU13130</p>
    <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00005_c"/>
  <speciesReference species="M_C03287_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00006_c"/>
  <speciesReference species="M_C01165_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03314" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01165_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C03912_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03316" name="2-oxoglutarate dehydrogenase E1 component (EC
1.2.4.2)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU19370</p>
      <p>GENE_LIST: BSU19370</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C15972_c"/>
    <speciesReference species="M_C05381_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00068_c"/>
    <speciesReference species="M_C16254_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03321" name="Glucose-6-phosphate isomerase (EC 5.3.1.9)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU31350</p>
      <p>GENE_LIST: BSU31350</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C01172_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C05345_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03346" name="5'-nucleotidase yjjG (EC 3.1.3.5);2',3'-cyclic-nucleotide
2'-phosphodiesterase (EC 3.1.4.16)|5'-nucleotidase (EC 3.1.3.5)(BSU07840)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU07840 or BSU07330 )</p>
      <p>GENE_LIST: BSU07840 BSU07330</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01185_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C05841_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

</kineticLaw>
</reaction>
<reaction id="R_R03348" name="Quinolinate phosphoribosyltransferase [decarboxylating]
(EC 2.4.2.19)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27860</p>
      <p>GENE_LIST: BSU27860</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C03722_c"/>
    <speciesReference species="M_C00119_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C01185_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03371" name="alternate gene name: yzxA" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU19800</p>
      <p>GENE_LIST: BSU19800</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01204_c"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C04563_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03443" name="N-acetyl-gamma-glutamyl-phosphate reductase (EC
1.2.1.38)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU11190</p>
      <p>GENE_LIST: BSU11190</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C04133_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C01250_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_R03457" name="Imidazoleglycerol-phosphate dehydratase (EC 4.2.1.19)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU34900</p>
      <p>GENE_LIST: BSU34900</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C04666_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01267_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03458" name="5-amino-6-(5-phosphoribosylamino)uracil reductase (EC
1.1.1.193)|Diaminohydroxyphosphoribosylaminopyrimidine deaminase (EC 3.5.4.26)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU23280</p>
      <p>GENE_LIST: BSU23280</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C04454_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>

```

```

    <speciesReference species="M_C01268_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03459" name="5-amino-6-(5-phosphoribosylamino)uracil reductase (EC
1.1.1.193)|Diaminohydroxyphosphoribosylaminopyrimidine deaminase (EC 3.5.4.26)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU23280</p>
      <p>GENE_LIST: BSU23280</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01304_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C01268_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03460" name="5-Enolpyruvylshikimate-3-phosphate synthase (EC

```



2.5.1.19)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU22600</p>

<p>GENE\_LIST: BSU22600</p>

<p>SUBSYSTEM: Amino Acids and Derivatives</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00074\_c"/>

<speciesReference species="M\_C03175\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00009\_c"/>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C01269\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_R03492" name="hydrolyses bond between the N-acetylglucosaminy and the N-acetylmuramyl residues in the glycan chain">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU35780</p>

<p>GENE\_LIST: BSU35780</p>

<p>SUBSYSTEM: Cell Wall and Capsule</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_C06135\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C01132\_c"/>

<speciesReference species="M\_C01290\_c"/>

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03503" name="2-amino-4-hydroxy-6-hydroxymethyldihydropteridine
pyrophosphokinase (EC 2.7.6.3)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00790</p>
      <p>GENE_LIST: BSU00790</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C01300_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C04807_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03504" name="Dihydroneopterin aldolase (EC 4.1.2.25)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00780</p>

```

<p>GENE\_LIST: BSU00780</p>  
 <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C04874\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00266\_c"/>  
 <speciesReference species="M\_C01300\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_R03508" name="Indole-3-glycerol phosphate synthase (EC 4.1.1.48)"  
 reversible="false">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: BSU22660</p>  
 <p>GENE\_LIST: BSU22660</p>  
 <p>SUBSYSTEM: Amino Acids and Derivatives</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C01302\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00001\_c"/>  
 <speciesReference species="M\_C00011\_c"/>  
 <speciesReference species="M\_C03506\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>

```

    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03509" name="Phosphoribosylanthranilate isomerase (EC 5.3.1.24)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22650</p>
      <p>GENE_LIST: BSU22650</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C04302_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C01302_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03537" name="2',3'-cyclic-nucleotide 2'-phosphodiesterase (EC
3.1.4.16)|5'-nucleotidase (EC 3.1.3.5)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU07840</p>
      <p>GENE_LIST: BSU07840</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C02353_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C01367_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03538" name="2',3'-cyclic-nucleotide 2'-phosphodiesterase (EC
3.1.4.16)|5'-nucleotidase (EC 3.1.3.5)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU07840</p>
      <p>GENE_LIST: BSU07840</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C02355_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C01368_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03544" name="NADH-dependent butanol dehydrogenase B (EC
1.1.1.-);NADH-dependent butanol dehydrogenase A (EC 1.1.1.-)(BSU31370)">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: ( BSU31360 and BSU31370 )</p>
    <p>GENE_LIST: BSU31360 BSU31370</p>
    <p>SUBSYSTEM: Carbohydrates</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_C01412_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C06142_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03634" name="Alpha-galactosidase (EC 3.2.1.22)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30300</p>
      <p>GENE_LIST: BSU30300</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01613_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00492_c"/>
    <speciesReference species="M_C00124_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03646" name="Arginyl-tRNA synthetase (EC 6.1.1.19)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37330</p>
      <p>GENE_LIST: BSU37330</p>
      <p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00062_c"/>
    <speciesReference species="M_C01636_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C02163_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03648" name="AsparaginyI-tRNA synthetase (EC 6.1.1.22)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

```

    <p>GENE_ASSOCIATION: BSU22360</p>
    <p>GENE_LIST: BSU22360</p>
    <p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00152_c"/>
  <speciesReference species="M_C01637_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00020_c"/>
  <speciesReference species="M_C00013_c"/>
  <speciesReference species="M_C03402_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03650" name="CysteinyI-tRNA synthetase (EC 6.1.1.16)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00940</p>
      <p>GENE_LIST: BSU00940</p>
      <p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00097_c"/>
    <speciesReference species="M_C01639_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C03125_c"/>
  </listOfProducts>

```



```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03651" name="Glutamyl-tRNA synthetase (EC
6.1.1.17)Glutamyl-tRNA(Gln) synthetase" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00920</p>
      <p>GENE_LIST: BSU00920</p>
      <p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C01640_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C06112_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03654" name="Glycyl-tRNA synthetase beta chain (EC
6.1.1.14);Glycyl-tRNA synthetase alpha chain (EC 6.1.1.14)(BSU25270)" reversible="false">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: ( BSU25260 and BSU25270 )</p>
    <p>GENE_LIST: BSU25260 BSU25270</p>
    <p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00037_c"/>
  <speciesReference species="M_C01642_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00020_c"/>
  <speciesReference species="M_C00013_c"/>
  <speciesReference species="M_C02412_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03655" name="Histidyl-tRNA synthetase (EC 6.1.1.21)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27560</p>
      <p>GENE_LIST: BSU27560</p>
      <p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00135_c"/>
    <speciesReference species="M_C01643_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00020_c"/>

```

```

    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C02988_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03656" name="Isoleucyl-tRNA synthetase (EC 6.1.1.5)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15430</p>
      <p>GENE_LIST: BSU15430</p>
      <p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00407_c"/>
    <speciesReference species="M_C01644_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C03127_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

<reaction id="R_R03657" name="Leucyl-tRNA synthetase (EC 6.1.1.4)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30320</p>
      <p>GENE_LIST: BSU30320</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00123_c"/>
    <speciesReference species="M_C01645_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C02047_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03658" name="Lysyl-tRNA synthetase (class II) (EC 6.1.1.6)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00820</p>
      <p>GENE_LIST: BSU00820</p>
      <p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00047_c"/>
    <speciesReference species="M_C01646_c"/>
  </listOfReactants>
  <listOfProducts>

```

```

    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C01931_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03659" name="Methionyl-tRNA synthetase" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00380</p>
      <p>GENE_LIST: BSU00380</p>
      <p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00073_c"/>
    <speciesReference species="M_C01647_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C02430_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

<reaction id="R\_R03660" name="Phenylalanyl-tRNA synthetase beta chain (EC 6.1.1.20);Phenylalanyl-tRNA synthetase alpha chain (EC 6.1.1.20)(BSU28640)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU28630 and BSU28640 )</p>

<p>GENE\_LIST: BSU28630 BSU28640</p>

<p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00002\_c"/>

<speciesReference species="M\_C00079\_c"/>

<speciesReference species="M\_C01648\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00020\_c"/>

<speciesReference species="M\_C00013\_c"/>

<speciesReference species="M\_C03511\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_R03661" name="Prolyl-tRNA synthetase (EC 6.1.1.15)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU16570</p>

<p>GENE\_LIST: BSU16570</p>

<p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00002\_c"/>

<speciesReference species="M\_C00148\_c"/>

<speciesReference species="M\_C01649\_c"/>

</listOfReactants>

```

<listOfProducts>
  <speciesReference species="M_C00020_c"/>
  <speciesReference species="M_C00013_c"/>
  <speciesReference species="M_C02702_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03662" name="Seryl-tRNA synthetase" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00130</p>
      <p>GENE_LIST: BSU00130</p>
      <p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00065_c"/>
    <speciesReference species="M_C01650_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C02553_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_R03663" name="Threonyl-tRNA synthetase (EC 6.1.1.3)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU28950 or BSU37560 )</p>
      <p>GENE_LIST: BSU28950 BSU37560</p>
      <p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00188_c"/>
    <speciesReference species="M_C01651_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C02992_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03664" name="Tryptophanyl-tRNA synthetase (EC 6.1.1.2)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU11420</p>
      <p>GENE_LIST: BSU11420</p>
      <p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00078_c"/>
    <speciesReference species="M_C01652_c"/>

```



```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00020_c"/>
  <speciesReference species="M_C00013_c"/>
  <speciesReference species="M_C03512_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03665" name="Valyl-tRNA synthetase (EC 6.1.1.9)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU28090</p>
      <p>GENE_LIST: BSU28090</p>
      <p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00183_c"/>
    <speciesReference species="M_C01653_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C02554_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

</kineticLaw>
</reaction>
<reaction id="R_R03758" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C03508_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C01888_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03778" name="3-ketoacyl-CoA thiolase (EC 2.3.1.16)|Acetyl-CoA
acetyltransferase (EC 2.3.1.9);3-ketoacyl-CoA thiolase [isoleucine degradation] (EC
2.3.1.16)(BSU24170)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU32830 or BSU10350 or BSU24170 )</p>
      <p>GENE_LIST: BSU32830 BSU10350 BSU24170</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C01944_c"/>
  </listOfReactants>
  <listOfProducts>

```

```

    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C05265_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03858" name="3-ketoacyl-CoA thiolase (EC 2.3.1.16)|Acetyl-CoA
acetyltransferase (EC 2.3.1.9);3-ketoacyl-CoA thiolase [isoleucine degradation] (EC
2.3.1.16)(BSU24170)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU32830 or BSU10350 or BSU24170 )</p>
      <p>GENE_LIST: BSU32830 BSU10350 BSU24170</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C01832_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C05261_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03905" name="Aspartyl-tRNA(Asn) amidotransferase subunit C (EC

```

6.3.5.-)|Glutamyl-tRNA(Gln) amidotransferase subunit C (EC 6.3.5.-);Aspartyl-tRNA(Asn) amidotransferase subunit A (EC 6.3.5.-)|Glutamyl-tRNA(Gln) amidotransferase subunit A (EC 6.3.5.-)(BSU06680);Aspartyl-tRNA(Asn) amidotransferase subunit B (EC 6.3.5.-)|Glutamyl-tRNA(Gln) amidotransferase subunit B (EC 6.3.5.-)(BSU06690)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU06670 and BSU06680 and BSU06690 )</p>

<p>GENE\_LIST: BSU06670 BSU06680 BSU06690</p>

<p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C06112\_c"/>

<speciesReference species="M\_C00064\_c"/>

<speciesReference species="M\_C00002\_c"/>

<speciesReference species="M\_C00001\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C02282\_c"/>

<speciesReference species="M\_C00025\_c"/>

<speciesReference species="M\_C00009\_c"/>

<speciesReference species="M\_C00008\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_R03913" name="">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: </p>

<p>GENE\_LIST: </p>

<p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>

</html>

</notes>

<listOfReactants>

```

    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C02315_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C02582_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03914" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C02315_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C02582_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03921" name="Sucrose-6-phosphate hydrolase (EC 3.2.1.26)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU38040</p>
      <p>GENE_LIST: BSU38040</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C16688_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00095_c"/>
    <speciesReference species="M_C00668_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03929" name="2',3'-cyclic-nucleotide 2'-phosphodiesterase (EC
3.1.4.16)|5'-nucleotidase (EC 3.1.3.5)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU07840</p>
      <p>GENE_LIST: BSU07840</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C02354_c"/>
  </listOfReactants>
  <listOfProducts>

```

```

    <speciesReference species="M_C05822_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03947" name="Precorrin-2 oxidase (EC 1.3.1.76)|Siroheme synthase">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15630</p>
      <p>GENE_LIST: BSU15630</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C02463_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C05778_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03968" name="3-isopropylmalate dehydratase small subunit (EC
4.2.1.33);3-isopropylmalate dehydratase large subunit (EC 4.2.1.33)(BSU28260)">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: ( BSU28260 or BSU28250 )</p>
  <p>GENE_LIST: BSU28260 BSU28250</p>
  <p>SUBSYSTEM: Amino Acids and Derivatives</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C02504_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C02631_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03970" name="Gamma-glutamyltranspeptidase (EC 2.3.2.2)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU18410</p>
      <p>GENE_LIST: BSU18410</p>
      <p>SUBSYSTEM: Sulfur Metabolism</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C02512_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C05711_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```



```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03971" name="Gamma-glutamyltranspeptidase (EC 2.3.2.2)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU18410</p>
      <p>GENE_LIST: BSU18410</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C02512_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C06114_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R03975" name="Choloylglycine hydrolase (EC 3.5.1.24)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU39540</p>
      <p>GENE_LIST: BSU39540</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C05466_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00037_c"/>
  <speciesReference species="M_C02528_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R03991" name="3-ketoacyl-CoA thiolase (EC 2.3.1.16)|Acetyl-CoA
acetyltransferase (EC 2.3.1.9);3-ketoacyl-CoA thiolase [isoleucine degradation] (EC
2.3.1.16)(BSU24170)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU32830 or BSU10350 or BSU24170 )</p>
      <p>GENE_LIST: BSU32830 BSU10350 BSU24170</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C02593_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C05259_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04001" name="3-isopropylmalate dehydratase small subunit (EC
4.2.1.33);3-isopropylmalate dehydratase large subunit (EC 4.2.1.33)(BSU28260)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU28250 and BSU28260 )</p>
      <p>GENE_LIST: BSU28250 BSU28260</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C04411_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C02631_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04030" name="O-succinylbenzoic acid--CoA ligase (EC 6.2.1.26)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30790</p>
      <p>GENE_LIST: BSU30790</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>

```

```

    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C02730_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C03160_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04031" name="O-succinylbenzoate-CoA synthase (EC 4.2.1.-)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30780</p>
      <p>GENE_LIST: BSU30780</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C05817_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C02730_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>

```

```

</kineticLaw>
</reaction>
<reaction id="R_R04035" name="Phosphoribosyl-AMP cyclohydrolase (EC
3.5.4.19)|Phosphoribosyl-ATP pyrophosphatase (EC 3.6.1.31)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU34860</p>
      <p>GENE_LIST: BSU34860</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C02739_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C02741_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04037" name="Phosphoribosyl-AMP cyclohydrolase (EC
3.5.4.19)|Phosphoribosyl-ATP pyrophosphatase (EC 3.6.1.31)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU34860</p>
      <p>GENE_LIST: BSU34860</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C02741_c"/>
  </listOfReactants>
  <listOfProducts>

```

```

    <speciesReference species="M_C04896_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04065" name="Aldehyde dehydrogenase (EC 1.2.1.3)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU07350 or BSU37960 or BSU39860 or BSU38830 or
BSU19310 )</p>
      <p>GENE_LIST: BSU07350 BSU37960 BSU39860 BSU38830 BSU19310</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C05130_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C02835_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04095" name="Isovaleryl-CoA dehydrogenase (EC 1.3.99.10)">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: BSU18260</p>
    <p>GENE_LIST: BSU18260</p>
    <p>SUBSYSTEM: Amino Acids and Derivatives</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C02939_c"/>
  <speciesReference species="M_C00016_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C01352_c"/>
  <speciesReference species="M_C03069_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04097" name="Dihydrolipoamide acyltransferase component of
branched-chain alpha-keto acid dehydrogenase complex (EC 2.3.1.168)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU24030</p>
      <p>GENE_LIST: BSU24030</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C02939_c"/>
    <speciesReference species="M_C15973_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C15975_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04109" name="Glutamyl-tRNA reductase (EC 1.2.1.70)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU28170</p>
      <p>GENE_LIST: BSU28170</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C02987_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C03741_c"/>
    <speciesReference species="M_C01641_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04112" name="Germination-specific N-acetylmuramoyl-L-alanine amidase
(EC 3.5.1.28), cell wall hydrolase CwID;N-acetylmuramoyl-L-alanine amidase cwIH precursor
(EC 3.5.1.28)(BSU25710);N-acetylmuramoyl-L-alanine amidase xlyB (EC 3.5.1.28) (Cell wall
hydrolase) (Autolysin)(BSU12460);N-acetylmuramoyl-L-alanine amidase xlyA (EC 3.5.1.28)
(Cell wall hydrolase) (Autolysin)(BSU12810);Sporulation-specific N-acetylmuramoyl-L-alanine

```



amidase (EC 3.5.1.28) (Cell wall hydrolase)  
 (Autolysin)(BSU17410);N-acetylmuramoyl-L-alanine amidase cwlA (EC 3.5.1.28) (Cell wall  
 hydrolase) (Autolysin)(BSU25900);N-acetylmuramoyl-L-alanine  
 amidase(BSU02600);N-acetylmuramoyl-L-alanine  
 amidase(BSU13820);N-acetylmuramoyl-L-alanine  
 amidase(BSU22930);N-acetylmuramoyl-L-alanine  
 amidase(BSU21410);N-acetylmuramoyl-L-alanine  
 amidase(BSU27580);N-acetylmuramoyl-L-alanine amidase (major autolysin)  
 (CWBP49)(BSU35620);N-acetylmuramoyl-L-alanine  
 amidase(BSU24190);N-acetylmuramoyl-L-alanine amidase, family 4(BSU31120)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU01530 or BSU25710 or BSU12460 or BSU12810 or  
 BSU17410 or BSU25900 or BSU02600 or BSU13820 or BSU22930 or BSU21410 or BSU27580  
 or BSU35620 or BSU24190 or BSU31120 )</p>

<p>GENE\_LIST: BSU01530 BSU25710 BSU12460 BSU12810 BSU17410 BSU25900  
 BSU02600 BSU13820 BSU22930 BSU21410 BSU27580 BSU35620 BSU24190 BSU31120</p>

<p>SUBSYSTEM: Cell Wall and Capsule</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_C02999\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00041\_c"/>

<speciesReference species="M\_C05887\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_R04138" name="Methylcrotonyl-CoA carboxylase carboxyl transferase  
 subunit (EC 6.4.1.4);Biotin carboxylase of methylcrotonyl-CoA carboxylase (EC  
 6.3.4.14)(BSU18240);Biotin carboxyl carrier protein of methylcrotonyl-CoA  
 carboxylase(Bsu1823a)" reversible="false">

<notes>

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: ( BSU18210 and Bsu1823a and BSU18240 )</p>
  <p>GENE_LIST: BSU18210 BSU18240</p>
  <p>SUBSYSTEM: Amino Acids and Derivatives</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00288_c"/>
  <speciesReference species="M_C03069_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C03231_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04143" name="5-methylthioribose kinase (EC 2.7.1.100)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13560</p>
      <p>GENE_LIST: BSU13560</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C03089_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C04188_c"/>
  </listOfProducts>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04144" name="Phosphoribosylamine--glycine ligase (EC 6.3.4.13)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU06530</p>
      <p>GENE_LIST: BSU06530</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00037_c"/>
    <speciesReference species="M_C03090_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C03838_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04170" name="Enoyl-CoA hydratase (EC 4.2.1.17);enoyl-CoA

```

```

hydratase(BSU17160);enoyl-CoA hydratase(BSU09880)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU28540 or BSU17160 or BSU09880 or
BSU17170 )</p>
      <p>GENE_LIST: BSU28540 BSU17160 BSU09880 BSU17170</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C05262_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C03221_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04173" name="Phosphoserine aminotransferase (EC 2.6.1.52)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU10020</p>
      <p>GENE_LIST: BSU10020</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00026_c"/>
    <speciesReference species="M_C01005_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C03232_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04175" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C03239_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C04092_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04199" name="Dihydrodipicolinate reductase (EC 1.3.1.26)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22490</p>
      <p>GENE_LIST: BSU22490</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00006_c"/>
  <speciesReference species="M_C03972_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00005_c"/>
  <speciesReference species="M_C03340_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04203" name="3-hydroxyacyl-CoA dehydrogenase (EC
1.1.1.35)|Enoyl-CoA hydratase [isoleucine degradation] (EC 4.2.1.17)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32840</p>
      <p>GENE_LIST: BSU32840</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C04405_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C03344_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04204" name="Enoyl-CoA hydratase (EC 4.2.1.17);enoyl-CoA
hydratase(BSU17160);enoyl-CoA hydratase(BSU09880)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU28540 or BSU17160 or BSU09880 )</p>
      <p>GENE_LIST: BSU28540 BSU17160 BSU09880</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C04405_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C03345_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04208" name="Phosphoribosylformylglycinamide cyclo-ligase (EC
6.3.3.1)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU06500</p>
      <p>GENE_LIST: BSU06500</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>

```

```

    <speciesReference species="M_C04640_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C03373_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04212" name="Aspartyl-tRNA(Asn) amidotransferase subunit C (EC
6.3.5.-)|Glutamyl-tRNA(Gln) amidotransferase subunit C (EC 6.3.5.-);Aspartyl-tRNA(Asn)
amidotransferase subunit A (EC 6.3.5.-)|Glutamyl-tRNA(Gln) amidotransferase subunit A (EC
6.3.5.-)(BSU06680);Aspartyl-tRNA(Asn) amidotransferase subunit B (EC
6.3.5.-)|Glutamyl-tRNA(Gln) amidotransferase subunit B (EC 6.3.5.-)(BSU06690)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU06670 and BSU06680 and BSU06690 )</p>
      <p>GENE_LIST: BSU06670 BSU06680 BSU06690</p>
      <p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C06113_c"/>
    <speciesReference species="M_C00064_c"/>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C03402_c"/>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00008_c"/>
  </listOfProducts>

```



```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04218" name="Phytoene synthase (EC 2.5.1.32)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU10810</p>
      <p>GENE_LIST: BSU10810</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C03427_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C05421_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04224" name="Enoyl-CoA hydratase (EC 4.2.1.17);enoyl-CoA
hydratase(BSU17160);enoyl-CoA hydratase(BSU09880)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU28540 or BSU17160 or BSU09880 or
BSU17170 )</p>
      <p>GENE_LIST: BSU28540 BSU17160 BSU09880 BSU17170</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00013_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00013_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    <p>SUBSYSTEM: Amino Acids and Derivatives</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C03460_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C06000_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04231" name="Phosphopantothencysteine decarboxylase (EC
4.1.1.36)|Phosphopantothencysteine synthetase (EC 6.3.2.5)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15700</p>
      <p>GENE_LIST: BSU15700</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00063_c"/>
    <speciesReference species="M_C00097_c"/>
    <speciesReference species="M_C03492_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00055_c"/>
    <speciesReference species="M_C04352_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04286" name="6-pyruvoyl tetrahydrobiopterin synthase">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13730</p>
      <p>GENE_LIST: BSU13730</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C04895_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C03684_c"/>
    <speciesReference species="M_C00536_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04292" name="Quinolinate synthetase (EC 4.1.99.-)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27850</p>
      <p>GENE_LIST: BSU27850</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00111_c"/>
    <speciesReference species="M_C05840_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00001_c" stoichiometry="2"/>
  <speciesReference species="M_C03722_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04325" name="Phosphoribosylglycinamide formyltransferase (EC
2.1.2.2)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU06510</p>
      <p>GENE_LIST: BSU06510</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00234_c"/>
    <speciesReference species="M_C03838_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C04376_c"/>
    <speciesReference species="M_C00101_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04336" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C03871_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C03972_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04355" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC
2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC
2.3.1.41)(BSU11340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and
BSU11340 ) )</p>
      <p>GENE_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>

```

```

    <speciesReference species="M_C01209_c"/>
    <speciesReference species="M_C03939_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_C05744_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04364" name="2,3,4,5-tetrahydropyridine-2,6-dicarboxylate
N-acetyltransferase (EC 2.3.1.89)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU14180</p>
      <p>GENE_LIST: BSU14180</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C03972_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C05539_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04383" name="4-deoxy-L-threo-5-hexosulose-uronate ketol-isomerase (EC
5.3.1.17)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22130</p>
      <p>GENE_LIST: BSU22130</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C04053_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C04349_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04385" name="Biotin operon repressor|Biotin-protein ligase (EC
6.3.4.15);Biotin carboxylase of acetyl-CoA carboxylase (EC 6.3.4.14)(BSU24340);Biotin
carboxyl carrier protein of acetyl-CoA carboxylase(BSU24350)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU24350 and BSU24340 and BSU22440 )</p>
      <p>GENE_LIST: BSU24350 BSU24340 BSU22440</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00288_c"/>
    <speciesReference species="M_C06250_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C04419_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04386" name="Acetyl-coenzyme A carboxyl transferase alpha chain (EC
6.4.1.2);Acetyl-coenzyme A carboxyl transferase beta chain (EC 6.4.1.2)(BSU29210)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU29210 and BSU29200 )</p>
      <p>GENE_LIST: BSU29210 BSU29200</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C04419_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00083_c"/>
    <speciesReference species="M_C06250_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```



```

</kineticLaw>
</reaction>
<reaction id="R_R04405" name="5-methyltetrahydropteroyltriglutamate--homocysteine
methyltransferase (EC 2.1.1.14)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13180</p>
      <p>GENE_LIST: BSU13180</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C04489_c"/>
    <speciesReference species="M_C00155_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C04144_c"/>
    <speciesReference species="M_C00073_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04420" name="Methylthioribose-1-phosphate isomerase (EC 5.3.1.23)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13550</p>
      <p>GENE_LIST: BSU13550</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C04188_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C04582_c"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04424" name="2-methylcitrate dehydratase (EC 4.2.1.79)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU24130</p>
      <p>GENE_LIST: BSU24130</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C02225_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C04225_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04425" name="2-methylisocitrate dehydratase (EC 4.2.1.99)|Aconitate
hydratase (EC 4.2.1.3)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU18000</p>
      <p>GENE_LIST: BSU18000</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>

```

```

</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C04593_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C04225_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04426" name="3-isopropylmalate dehydrogenase (EC 1.1.1.85)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU28270</p>
      <p>GENE_LIST: BSU28270</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C04411_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C04236_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04428" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase
(EC 4.2.1.-)">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: BSU36370</p>
            <p>GENE_LIST: BSU36370</p>
            <p>SUBSYSTEM: Fatty Acids and Lipids</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C04618_c"/>
    </listOfReactants>
    <listOfProducts>
        <speciesReference species="M_C00001_c"/>
        <speciesReference species="M_C04246_c"/>
    </listOfProducts>
    <kineticLaw>
        <math xmlns="http://www.w3.org/1998/Math/MathML">
            <ci> FLUX_VALUE </ci>
        </math>
        <listOfParameters>
            <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
            <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
            <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
        </listOfParameters>
    </kineticLaw>
</reaction>
<reaction id="R_R04429" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC
1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)"
reversible="false">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: ( BSU11720 or BSU26800 )</p>
            <p>GENE_LIST: BSU11720 BSU26800</p>
            <p>SUBSYSTEM: Fatty Acids and Lipids</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00080_c"/>
        <speciesReference species="M_C00004_c"/>

```

```

    <speciesReference species="M_C04246_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C05745_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04430" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C04246_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C05745_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>

```

```

    </kineticLaw>
  </reaction>
  <reaction id="R_R04440" name="Ketol-acid reductoisomerase (EC 1.1.1.86)">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU28290</p>
        <p>GENE_LIST: BSU28290</p>
        <p>SUBSYSTEM: Amino Acids and Derivatives</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00006_c"/>
      <speciesReference species="M_C04039_c"/>
    </listOfReactants>
    <listOfProducts>
      <speciesReference species="M_C00080_c"/>
      <speciesReference species="M_C00005_c"/>
      <speciesReference species="M_C04181_c"/>
    </listOfProducts>
    <kineticLaw>
      <math xmlns="http://www.w3.org/1998/Math/MathML">
        <ci> FLUX_VALUE </ci>
      </math>
      <listOfParameters>
        <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
      </listOfParameters>
    </kineticLaw>
  </reaction>
  <reaction id="R_R04441" name="Dihydroxy-acid dehydratase (EC 4.2.1.9)"
reversible="false">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU21870</p>
        <p>GENE_LIST: BSU21870</p>
        <p>SUBSYSTEM: Amino Acids and Derivatives</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C04039_c"/>
    </listOfReactants>
    <listOfProducts>
      <speciesReference species="M_C00001_c"/>

```

```

    <speciesReference species="M_C00141_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04444" name="Delta-1-pyrroline-5-carboxylate dehydrogenase (EC
1.5.1.12)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU37780 or BSU03210 )</p>
      <p>GENE_LIST: BSU37780 BSU03210</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00001_c" stoichiometry="2"/>
    <speciesReference species="M_C04281_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C05947_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04448" name="Hydroxyethylthiazole kinase (EC 2.7.1.50)"

```

```

reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU38300</p>
      <p>GENE_LIST: BSU38300</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C04294_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C04327_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04457" name="6,7-dimethyl-8-ribityllumazine synthase (EC 2.5.1.9)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU23250</p>
      <p>GENE_LIST: BSU23250</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C04732_c"/>
    <speciesReference species="M_C15556_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00001_c" stoichiometry="2"/>
    <speciesReference species="M_C04332_c"/>
  </listOfProducts>

```



```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04463" name="Phosphoribosylformylglycinamide synthase, glutamine
amidotransferase subunit (EC 6.3.5.3);Phosphoribosylformylglycinamide synthase, synthetase
subunit (EC 6.3.5.3)(BSU06480);Phosphoribosylformylglycinamide synthase, PurS subunit (EC
6.3.5.3)(BSU06460)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU06460 and BSU06470 and BSU06480 )</p>
      <p>GENE_LIST: BSU06460 BSU06470 BSU06480</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00064_c"/>
    <speciesReference species="M_C04376_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C04640_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04467" name="N-acetyl-L,L-diaminopimelate aminotransferase homolog
(EC 2.6.1.-);N-acetyl-L,L-diaminopimelate aminotransferase (EC 2.6.1.-)(BSU14000)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU14000 or BSU31400 )</p>
      <p>GENE_LIST: BSU14000 BSU31400</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C05539_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00026_c"/>
    <speciesReference species="M_C04390_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04486" name="Choloylglycine hydrolase (EC 3.5.1.24)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU39540</p>
      <p>GENE_LIST: BSU39540</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C05464_c"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00037_c"/>
  <speciesReference species="M_C04483_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04509" name="Phosphomethylpyrimidine kinase (EC 2.7.4.7)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU11710 or BSU38020 )</p>
      <p>GENE_LIST: BSU11710 BSU38020</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C04556_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C04752_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04533" name="3-oxoacyl-[acyl-carrier protein] reductase (EC

```

1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein] reductase(BSU29420)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>

<p>GENE\_LIST: BSU15910 BSU16870 BSU29420</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00006\_c"/>

<speciesReference species="M\_C04618\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00005\_c"/>

<speciesReference species="M\_C05744\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_R04534" name="3-oxoacyl-[acyl-carrier protein] reductase (EC 1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein] reductase(BSU29420)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>

<p>GENE\_LIST: BSU15910 BSU16870 BSU29420</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00006\_c"/>

<speciesReference species="M\_C04619\_c"/>

</listOfReactants>

<listOfProducts>

```

    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C05753_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04535" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase
(EC 4.2.1.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36370</p>
      <p>GENE_LIST: BSU36370</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C04619_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C05754_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04536" name="3-oxoacyl-[acyl-carrier protein] reductase (EC
1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein]

```

reductase(BSU29420)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>

<p>GENE\_LIST: BSU15910 BSU16870 BSU29420</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00006\_c"/>

<speciesReference species="M\_C04620\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00005\_c"/>

<speciesReference species="M\_C05750\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_R04537" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase  
(EC 4.2.1.-)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU36370</p>

<p>GENE\_LIST: BSU36370</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C04620\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_C05751\_c"/>

</listOfProducts>

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04543" name="3-oxoacyl-[acyl-carrier protein] reductase (EC
1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein]
reductase(BSU29420)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>
      <p>GENE_LIST: BSU15910 BSU16870 BSU29420</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C04633_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C05762_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04544" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase
(EC 4.2.1.-)">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: BSU36370</p>
  <p>GENE_LIST: BSU36370</p>
  <p>SUBSYSTEM: Fatty Acids and Lipids</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C04633_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C05763_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04558" name="Imidazole glycerol phosphate synthase cyclase subunit (EC
4.1.3.-);Imidazole glycerol phosphate synthase amidotransferase subunit (EC 2.4.2.-)(BSU34890)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU34870 and BSU34890 )</p>
      <p>GENE_LIST: BSU34870 BSU34890</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00064_c"/>
    <speciesReference species="M_C04916_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C04666_c"/>
    <speciesReference species="M_C04677_c"/>
  </listOfProducts>

```



```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04559" name="Adenylosuccinate lyase (EC 4.3.2.2)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU06440</p>
      <p>GENE_LIST: BSU06440</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C04823_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00122_c"/>
    <speciesReference species="M_C04677_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04560" name="IMP cyclohydrolase (EC
3.5.4.10)|Phosphoribosylaminoimidazolecarboxamide formyltransferase (EC 2.1.2.3)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU06520</p>
      <p>GENE_LIST: BSU06520</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>

```

```

</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00234_c"/>
  <speciesReference species="M_C04677_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00101_c"/>
  <speciesReference species="M_C04734_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04566" name="3-oxoacyl-[acyl-carrier protein] reductase (EC
1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein]
reductase(BSU29420)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>
      <p>GENE_LIST: BSU15910 BSU16870 BSU29420</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C04688_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C05759_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04568" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase
(EC 4.2.1.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36370</p>
      <p>GENE_LIST: BSU36370</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C04688_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C05760_c"/>
    <speciesReference species="M_C00001_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04591" name="Phosphoribosylaminoimidazole-succinocarboxamide
synthase (EC 6.3.2.6)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU06450</p>
      <p>GENE_LIST: BSU06450</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00049_c"/>
    <speciesReference species="M_C04751_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C04823_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04617"
name="UDP-N-acetylmuramoylalanyl-D-glutamyl-2,6-diaminopimelate--D-alanyl-D-
ligase (EC 6.3.2.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU04570</p>
      <p>GENE_LIST: BSU04570</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C04877_c"/>
    <speciesReference species="M_C00993_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C04882_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04620" name="Alkaline phosphatase (EC 3.1.3.1)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU05740 or BSU09410 )</p>
      <p>GENE_LIST: BSU05740 BSU09410</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c" stoichiometry="3"/>
    <speciesReference species="M_C04895_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c" stoichiometry="3"/>
    <speciesReference species="M_C00080_c" stoichiometry="3"/>
    <speciesReference species="M_C04874_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04639" name="GTP cyclohydrolase I (EC 3.5.4.16) type 1;GTP
cyclohydrolase I (EC 3.5.4.16) type 2(BSU03340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU22780 or BSU03340 )</p>
      <p>GENE_LIST: BSU22780 BSU03340</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>

```

```

    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C06148_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C04895_c"/>
    <speciesReference species="M_C00001_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04640" name="Phosphoribosylformimino-5-aminoimidazole carboxamide
ribose isomerase (EC 5.3.1.16)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU34880</p>
      <p>GENE_LIST: BSU34880</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C04896_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C04916_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>

```

```

    </kineticLaw>
  </reaction>
  <reaction id="R_R04673" name="Acetolactate synthase small subunit (EC
2.2.1.6);Acetolactate synthase large subunit (EC 2.2.1.6)(BSU28310)">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: ( BSU28300 and BSU28310 )</p>
        <p>GENE_LIST: BSU28300 BSU28310</p>
        <p>SUBSYSTEM: Amino Acids and Derivatives</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C05125_c"/>
      <speciesReference species="M_C00109_c"/>
    </listOfReactants>
    <listOfProducts>
      <speciesReference species="M_C00068_c"/>
      <speciesReference species="M_C06006_c"/>
    </listOfProducts>
    <kineticLaw>
      <math xmlns="http://www.w3.org/1998/Math/MathML">
        <ci> FLUX_VALUE </ci>
      </math>
      <listOfParameters>
        <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
      </listOfParameters>
    </kineticLaw>
  </reaction>
  <reaction id="R_R04724" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC
1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)"
reversible="false">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: ( BSU11720 or BSU26800 )</p>
        <p>GENE_LIST: BSU11720 BSU26800</p>
        <p>SUBSYSTEM: Cell Wall and Capsule</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00080_c"/>
      <speciesReference species="M_C00004_c"/>
      <speciesReference species="M_C05758_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C05223_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04725" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C05758_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C05223_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```



```

</reaction>
<reaction id="R_R04726" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC
2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC
2.3.1.41)(BSU11340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and
BSU11340 ) )</p>
      <p>GENE_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01209_c"/>
    <speciesReference species="M_C05223_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_C05759_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04737" name="3-hydroxyacyl-CoA dehydrogenase (EC
1.1.1.35)|Enoyl-CoA hydratase [isoleucine degradation] (EC 4.2.1.17)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32840</p>
      <p>GENE_LIST: BSU32840</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C05258_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C05259_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04738" name="Enoyl-CoA hydratase (EC 4.2.1.17);enoyl-CoA
hydratase(BSU17160);enoyl-CoA hydratase(BSU09880)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU28540 or BSU17160 or BSU09880 or
BSU17170 )</p>
      <p>GENE_LIST: BSU28540 BSU17160 BSU09880 BSU17170</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C05258_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C05272_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04739" name="3-hydroxyacyl-CoA dehydrogenase (EC
1.1.1.35)|Enoyl-CoA hydratase [isoleucine degradation] (EC 4.2.1.17)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32840</p>
      <p>GENE_LIST: BSU32840</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C05260_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C05261_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04740" name="Enoyl-CoA hydratase (EC 4.2.1.17);enoyl-CoA
hydratase(BSU17160);enoyl-CoA hydratase(BSU09880)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU28540 or BSU17160 or BSU09880 or
BSU17170 )</p>
      <p>GENE_LIST: BSU28540 BSU17160 BSU09880 BSU17170</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C05260_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C05273_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04741" name="3-hydroxyacyl-CoA dehydrogenase (EC
1.1.1.35)|Enoyl-CoA hydratase [isoleucine degradation] (EC 4.2.1.17)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32840</p>
      <p>GENE_LIST: BSU32840</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C05262_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C05263_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_R04742" name="3-ketoacyl-CoA thiolase (EC 2.3.1.16)|Acetyl-CoA
acetyltransferase (EC 2.3.1.9);3-ketoacyl-CoA thiolase [isoleucine degradation] (EC
2.3.1.16)(BSU24170)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU32830 or BSU10350 or BSU24170 )</p>
      <p>GENE_LIST: BSU32830 BSU10350 BSU24170</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C05274_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C05263_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04743" name="3-hydroxyacyl-CoA dehydrogenase (EC
1.1.1.35)|Enoyl-CoA hydratase [isoleucine degradation] (EC 4.2.1.17)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32840</p>
      <p>GENE_LIST: BSU32840</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C05264_c"/>
  </listOfReactants>
  <listOfProducts>

```

```

    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C05265_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04744" name="Enoyl-CoA hydratase (EC 4.2.1.17);enoyl-CoA
hydratase(BSU17160);enoyl-CoA hydratase(BSU09880)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU28540 or BSU17160 or BSU09880 or
BSU17170 )</p>
      <p>GENE_LIST: BSU28540 BSU17160 BSU09880 BSU17170</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C05264_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C05275_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04745" name="3-hydroxyacyl-CoA dehydrogenase (EC

```

1.1.1.35)|Enoyl-CoA hydratase [isoleucine degradation] (EC 4.2.1.17)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU32840</p>

<p>GENE\_LIST: BSU32840</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00003\_c"/>

<speciesReference species="M\_C05266\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00004\_c"/>

<speciesReference species="M\_C05267\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_R04746" name="Enoyl-CoA hydratase (EC 4.2.1.17);enoyl-CoA hydratase(BSU17160);enoyl-CoA hydratase(BSU09880)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU28540 or BSU17160 or BSU09880 or BSU17170 )</p>

<p>GENE\_LIST: BSU28540 BSU17160 BSU09880 BSU17170</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C05266\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_C05276\_c"/>

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04747" name="3-ketoacyl-CoA thiolase (EC 2.3.1.16)|Acetyl-CoA
acetyltransferase (EC 2.3.1.9);3-ketoacyl-CoA thiolase [isoleucine degradation] (EC
2.3.1.16)(BSU24170)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU32830 or BSU10350 or BSU24170 )</p>
      <p>GENE_LIST: BSU32830 BSU10350 BSU24170</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C05270_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C05267_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04748" name="3-hydroxyacyl-CoA dehydrogenase (EC
1.1.1.35)|Enoyl-CoA hydratase [isoleucine degradation] (EC 4.2.1.17)">
  <notes>

```



```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: BSU32840</p>
  <p>GENE_LIST: BSU32840</p>
  <p>SUBSYSTEM: Fatty Acids and Lipids</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C05268_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_C05269_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04749" name="Enoyl-CoA hydratase (EC 4.2.1.17);enoyl-CoA
hydratase(BSU17160);enoyl-CoA hydratase(BSU09880)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU28540 or BSU17160 or BSU09880 or
BSU17170 )</p>
      <p>GENE_LIST: BSU28540 BSU17160 BSU09880 BSU17170</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C05268_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C05271_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04773" name="Methionyl-tRNA synthetase" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00380</p>
      <p>GENE_LIST: BSU00380</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C05335_c"/>
    <speciesReference species="M_C01647_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C05336_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04779" name="6-phosphofructokinase (EC 2.7.1.11)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU29190</p>
      <p>GENE_LIST: BSU29190</p>

```

```

    <p>SUBSYSTEM: Carbohydrates</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C05345_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C05378_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04780" name="Fructose-1,6-bisphosphatase, Bacillus type (EC
3.1.3.11);Fructose-1,6-bisphosphatase, GlpX type (EC 3.1.3.11)(BSU37090)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU37090 or BSU40190 )</p>
      <p>GENE_LIST: BSU37090 BSU40190</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C05378_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C05345_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

</listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04859" name="Cysteine synthase (EC 2.5.1.47)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU00730 or BSU29970 )</p>
      <p>GENE_LIST: BSU00730 BSU29970</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00342_c"/>
    <speciesReference species="M_C00979_c"/>
    <speciesReference species="M_C00320_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00033_c"/>
    <speciesReference species="M_C11481_c"/>
    <speciesReference species="M_C00343_c"/>
    <speciesReference species="M_C00097_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04951" name="Probable cytosol aminopeptidase (EC 3.4.11.1) (Leucine
aminopeptidase) (LAP) (Leucyl aminopeptidase)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32050</p>
      <p>GENE_LIST: BSU32050</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>

```

```

    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C05729_c"/>
    <speciesReference species="M_C00001_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C05726_c"/>
    <speciesReference species="M_C00037_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04952" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC
2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC
2.3.1.41)(BSU11340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and
BSU11340 ) )</p>
      <p>GENE_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01209_c"/>
    <speciesReference species="M_C05745_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_C05746_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04953" name="3-oxoacyl-[acyl-carrier protein] reductase (EC
1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein]
reductase(BSU29420)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>
      <p>GENE_LIST: BSU15910 BSU16870 BSU29420</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C05747_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C05746_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04954" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase
(EC 4.2.1.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

<p>GENE\_ASSOCIATION: BSU36370</p>  
 <p>GENE\_LIST: BSU36370</p>  
 <p>SUBSYSTEM: Fatty Acids and Lipids</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C05747\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C05748\_c"/>  
 <speciesReference species="M\_C00001\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_R04955" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC 1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)" reversible="false">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: ( BSU11720 or BSU26800 )</p>  
 <p>GENE\_LIST: BSU11720 BSU26800</p>  
 <p>SUBSYSTEM: Fatty Acids and Lipids</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C05748\_c"/>  
 <speciesReference species="M\_C00004\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C05749\_c"/>  
 <speciesReference species="M\_C00003\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04956" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C05748_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C05749_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04957" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC
2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC
2.3.1.41)(BSU11340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```



<p>GENE\_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and BSU11340 ) )</p>

<p>GENE\_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C05749\_c"/>

<speciesReference species="M\_C01209\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00011\_c"/>

<speciesReference species="M\_C00229\_c"/>

<speciesReference species="M\_C05750\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_R04958" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC 1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU11720 or BSU26800 )</p>

<p>GENE\_LIST: BSU11720 BSU26800</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00004\_c"/>

<speciesReference species="M\_C05751\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00003\_c"/>

```

    <speciesReference species="M_C05752_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04959" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C05751_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C05752_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04960" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC

```

2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC 2.3.1.41)(BSU11340)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and BSU11340 ) )</p>

<p>GENE\_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C01209\_c"/>

<speciesReference species="M\_C05752\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00011\_c"/>

<speciesReference species="M\_C00229\_c"/>

<speciesReference species="M\_C05753\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_R04961" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC 1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU11720 or BSU26800 )</p>

<p>GENE\_LIST: BSU11720 BSU26800</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00004\_c"/>

```

    <speciesReference species="M_C05754_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C05755_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04962" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C05754_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C05755_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>

```

```

</kineticLaw>
</reaction>
<reaction id="R_R04963" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC
2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC
2.3.1.41)(BSU11340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and
BSU11340 ) )</p>
      <p>GENE_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01209_c"/>
    <speciesReference species="M_C05755_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_C05756_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04964" name="3-oxoacyl-[acyl-carrier protein] reductase (EC
1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein]
reductase(BSU29420)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>
      <p>GENE_LIST: BSU15910 BSU16870 BSU29420</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00006_c"/>
  <speciesReference species="M_C05757_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00005_c"/>
  <speciesReference species="M_C05756_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04965" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase
(EC 4.2.1.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36370</p>
      <p>GENE_LIST: BSU36370</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C05757_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C05758_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04966" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC
1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU11720 or BSU26800 )</p>
      <p>GENE_LIST: BSU11720 BSU26800</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C05760_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C05761_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04967" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C05760_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C05761_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04968" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC
2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC
2.3.1.41)(BSU11340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and
BSU11340 ) )</p>
      <p>GENE_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C05761_c"/>
    <speciesReference species="M_C01209_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_C05762_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>

```



```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04969" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC
1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU11720 or BSU26800 )</p>
      <p>GENE_LIST: BSU11720 BSU26800</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C05763_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C05764_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R04970" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>

```

```

    <p>SUBSYSTEM: Fatty Acids and Lipids</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00005_c"/>
  <speciesReference species="M_C05763_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00006_c"/>
  <speciesReference species="M_C05764_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R04986" name="Hydroxyaromatic non-oxidative decarboxylase protein B
(EC 4.1.1.-)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU03630</p>
      <p>GENE_LIST: BSU03630</p>
      <p>SUBSYSTEM: Metabolism of Aromatic Compounds</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C05809_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C05810_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05032"
name="UDP-N-acetylglucosamine--N-acetylmuramyl-(pentapeptide)
pyrophosphoryl-undecaprenol N-acetylglucosamine transferase (EC 2.4.1.227)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15220</p>
      <p>GENE_LIST: BSU15220</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00043_c"/>
    <speciesReference species="M_C05897_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c"/>
    <speciesReference species="M_C05898_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05046" name="GTP cyclohydrolase I (EC 3.5.4.16) type 1;GTP
cyclohydrolase I (EC 3.5.4.16) type 2(BSU03340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU22780 or BSU03340 )</p>
      <p>GENE_LIST: BSU22780 BSU03340</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C05922_c"/>
  <speciesReference species="M_C00001_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C05923_c"/>
  <speciesReference species="M_C00058_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R05048" name="GTP cyclohydrolase I (EC 3.5.4.16) type 1;GTP
cyclohydrolase I (EC 3.5.4.16) type 2(BSU03340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU22780 or BSU03340 )</p>
      <p>GENE_LIST: BSU22780 BSU03340</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C05923_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C06148_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </kineticLaw>
  </reaction>
  <reaction id="R_R05051" name="Delta-1-pyrroline-5-carboxylate dehydrogenase (EC
1.5.1.12)">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: ( BSU37780 or BSU03210 )</p>
        <p>GENE_LIST: BSU37780 BSU03210</p>
        <p>SUBSYSTEM: Amino Acids and Derivatives</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00080_c" stoichiometry="2"/>
      <speciesReference species="M_C00004_c"/>
      <speciesReference species="M_C05947_c"/>
    </listOfReactants>
    <listOfProducts>
      <speciesReference species="M_C00003_c"/>
      <speciesReference species="M_C00001_c"/>
      <speciesReference species="M_C05938_c"/>
    </listOfProducts>
    <kineticLaw>
      <math xmlns="http://www.w3.org/1998/Math/MathML">
        <ci> FLUX_VALUE </ci>
      </math>
      <listOfParameters>
        <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
      </listOfParameters>
    </kineticLaw>
  </reaction>
  <reaction id="R_R05052" name="Aspartate aminotransferase (EC 2.6.1.1)">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: ( BSU37690 or BSU22370 )</p>
        <p>GENE_LIST: BSU37690 BSU22370</p>
        <p>SUBSYSTEM: Amino Acids and Derivatives</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00026_c"/>
      <speciesReference species="M_C05947_c"/>
    </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00025_c"/>
  <speciesReference species="M_C05946_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R05053" name="D-alanine aminotransferase (EC 2.6.1.21) (D-aspartate
aminotransferase) (D-amino acid aminotransferase) (D-amino acid transaminase) (DAAT)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU09670</p>
      <p>GENE_LIST: BSU09670</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00402_c"/>
    <speciesReference species="M_C05946_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00036_c"/>
    <speciesReference species="M_C05947_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05066" name="3-hydroxyisobutyrate dehydrogenase">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: BSU07990</p>
    <p>GENE_LIST: BSU07990</p>
    <p>SUBSYSTEM: Fatty Acids and Lipids</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C06001_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_C06002_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R05068" name="Ketol-acid reductoisomerase (EC 1.1.1.86)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU28290</p>
      <p>GENE_LIST: BSU28290</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C06007_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C14463_c"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R05069" name="Ketol-acid reductoisomerase (EC 1.1.1.86)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU28290</p>
      <p>GENE_LIST: BSU28290</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C06006_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C14463_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05070" name="Dihydroxy-acid dehydratase (EC 4.2.1.9)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU21870</p>
      <p>GENE_LIST: BSU21870</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>

```



```

</notes>
<listOfReactants>
  <speciesReference species="M_C06007_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00671_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R05085" name="Phosphoserine aminotransferase (EC 2.6.1.52)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU10020</p>
      <p>GENE_LIST: BSU10020</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00026_c"/>
    <speciesReference species="M_C06055_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C06054_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </kineticLaw>
  </reaction>
  <reaction id="R_R05133" name="6-phospho-beta-glucosidase (EC 3.2.1.86)"
reversible="false">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: ( BSU38560 or BSU40110 )</p>
        <p>GENE_LIST: BSU38560 BSU40110</p>
        <p>SUBSYSTEM: Carbohydrates</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00001_c"/>
      <speciesReference species="M_C06187_c"/>
    </listOfReactants>
    <listOfProducts>
      <speciesReference species="M_C00530_c"/>
      <speciesReference species="M_C01172_c"/>
    </listOfProducts>
    <kineticLaw>
      <math xmlns="http://www.w3.org/1998/Math/MathML">
        <ci> FLUX_VALUE </ci>
      </math>
      <listOfParameters>
        <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
        <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
      </listOfParameters>
    </kineticLaw>
  </reaction>
  <reaction id="R_R05134" name="6-phospho-beta-glucosidase (EC 3.2.1.86)"
reversible="false">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: ( BSU38560 or BSU40110 )</p>
        <p>GENE_LIST: BSU38560 BSU40110</p>
        <p>SUBSYSTEM: Carbohydrates</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00001_c"/>
      <speciesReference species="M_C06188_c"/>
    </listOfReactants>
    <listOfProducts>

```

```

    <speciesReference species="M_C01172_c"/>
    <speciesReference species="M_C02323_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05135" name="2',3'-cyclic-nucleotide 2'-phosphodiesterase (EC
3.1.4.16)|5'-nucleotidase (EC 3.1.3.5)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU07840</p>
      <p>GENE_LIST: BSU07840</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C06194_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C06193_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05287" name="2-haloalkanoic acid dehalogenase (EC 3.8.1.2)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

```

    <p>GENE_ASSOCIATION: BSU28940</p>
    <p>GENE_LIST: BSU28940</p>
    <p>SUBSYSTEM: Carbohydrates</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C06755_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00160_c"/>
  <speciesReference species="M_C00698_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R05332" name="Glucosamine-1-phosphate N-acetyltransferase (EC
2.3.1.157)|N-acetylglucosamine-1-phosphate uridyltransferase (EC 2.7.7.23)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00500</p>
      <p>GENE_LIST: BSU00500</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C06156_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C04501_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R05338" name="D-arabino-3-hexulose 6-phosphate formaldehyde lyase">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU03460</p>
      <p>GENE_LIST: BSU03460</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00199_c"/>
    <speciesReference species="M_C00067_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C06019_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05339" name="6-phospho-3-hexuloisomerase">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU03450</p>
      <p>GENE_LIST: BSU03450</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C06019_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C05345_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R05378" name="5-keto-2-deoxy-D-gluconate-6 phosphate aldolase (EC
4.1.2.29)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU39670</p>
      <p>GENE_LIST: BSU39670</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C06893_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00111_c"/>
    <speciesReference species="M_C00222_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

<reaction id="R_R05389" name="4-oxalocrotonate tautomerase (EC 5.3.2.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37540</p>
      <p>GENE_LIST: BSU37540</p>
      <p>SUBSYSTEM: Metabolism of Aromatic Compounds</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C07478_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C07479_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05549" name="Alpha-galactosidase (EC 3.2.1.22)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30300</p>
      <p>GENE_LIST: BSU30300</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C05404_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C05402_c"/>
    <speciesReference species="M_C00124_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R05551" name="Aliphatic amidase amiE (EC 3.5.1.4)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13570</p>
      <p>GENE_LIST: BSU13570</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01659_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C00511_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05553" name="Aminodeoxychorismate lyase (EC 4.1.3.38)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00760</p>
      <p>GENE_LIST: BSU00760</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>

```



```

<listOfReactants>
  <speciesReference species="M_C11355_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00022_c"/>
  <speciesReference species="M_C00568_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R05554" name="Allantoate amidohydrolase (EC 3.5.3.9)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32530</p>
      <p>GENE_LIST: BSU32530</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C02091_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C00603_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

</kineticLaw>
</reaction>
<reaction id="R_R05566" name="N-acetylmannosaminyltransferase (EC 2.4.1.187)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35750</p>
      <p>GENE_LIST: BSU35750</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01170_c"/>
    <speciesReference species="M_C01289_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c"/>
    <speciesReference species="M_C04881_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05571" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C06311_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
  </listOfProducts>

```

```

    <speciesReference species="M_C01097_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05577" name="Aspartyl-tRNA synthetase (EC 6.1.1.12)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27550</p>
      <p>GENE_LIST: BSU27550</p>
      <p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01638_c"/>
    <speciesReference species="M_C00049_c"/>
    <speciesReference species="M_C00002_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C02984_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05578" name="Glutamyl-tRNA synthetase (EC

```

```

6.1.1.17)|Glutamyl-tRNA(Gln) synthetase" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00920</p>
      <p>GENE_LIST: BSU00920</p>
      <p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01641_c"/>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C00002_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C02987_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05590" name="Aliphatic amidase amiE (EC 3.5.1.4)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13570</p>
      <p>GENE_LIST: BSU13570</p>
      <p>SUBSYSTEM: Metabolism of Aromatic Compounds</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C09815_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C00180_c"/>
  </listOfProducts>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R05605" name="2-dehydro-3-deoxyphosphogluconate aldolase (EC
4.1.2.14)|4-Hydroxy-2-oxoglutarate aldolase (EC 4.1.3.16)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22100</p>
      <p>GENE_LIST: BSU22100</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C04442_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00118_c"/>
    <speciesReference species="M_C00022_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05606" name="Mannonate dehydratase (EC 4.2.1.8)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU12340</p>
      <p>GENE_LIST: BSU12340</p>

```

```

    <p>SUBSYSTEM: Carbohydrates</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00514_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00204_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R05608" name="D-galactarate dehydratase (EC 4.2.1.42)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02510</p>
      <p>GENE_LIST: BSU02510</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00879_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00679_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R05612" name="Heptaprenyl diphosphate synthase component II (EC
2.5.1.30);Heptaprenyl diphosphate synthase component I (EC 2.5.1.30)(BSU22760)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU22740 and BSU22760 )</p>
      <p>GENE_LIST: BSU22740 BSU22760</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00129_c"/>
    <speciesReference species="M_C01230_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C04216_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05613" name="Heptaprenyl diphosphate synthase component II (EC
2.5.1.30);Heptaprenyl diphosphate synthase component I (EC 2.5.1.30)(BSU22760)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU22740 and BSU22760 )</p>
      <p>GENE_LIST: BSU22740 BSU22760</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00129_c"/>
    <speciesReference species="M_C04217_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C01230_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05627" name="Undecaprenyl-diphosphatase (EC 3.6.1.27)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU31150</p>
      <p>GENE_LIST: BSU31150</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C04574_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00348_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>

```



```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05630" name="Phospho-N-acetylmuramoyl-pentapeptide-transferase (EC
2.7.8.13)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15190</p>
      <p>GENE_LIST: BSU15190</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00348_c"/>
    <speciesReference species="M_C04882_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00105_c"/>
    <speciesReference species="M_C05897_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05632" name="Salicylate hydroxylase (EC 1.14.13.1)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU07230</p>
      <p>GENE_LIST: BSU07230</p>
      <p>SUBSYSTEM: Metabolism of Aromatic Compounds</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C03203_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00011_c"/>
  <speciesReference species="M_C03012_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R05633" name="2-C-methyl-D-erythritol 4-phosphate cytidylyltransferase
(EC 2.7.7.60)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00900</p>
      <p>GENE_LIST: BSU00900</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00063_c"/>
    <speciesReference species="M_C11434_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C11435_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </kineticLaw>
  </reaction>
  <reaction id="R_R05634" name="4-diphosphocytidyl-2-C-methyl-D-erythritol kinase"
reversible="false">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU00460</p>
        <p>GENE_LIST: BSU00460</p>
        <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00002_c"/>
      <speciesReference species="M_C11435_c"/>
    </listOfReactants>
    <listOfProducts>
      <speciesReference species="M_C00008_c"/>
      <speciesReference species="M_C11436_c"/>
    </listOfProducts>
    <kineticLaw>
      <math xmlns="http://www.w3.org/1998/Math/MathML">
        <ci> FLUX_VALUE </ci>
      </math>
      <listOfParameters>
        <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
        <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
      </listOfParameters>
    </kineticLaw>
  </reaction>
  <reaction id="R_R05636" name="1-deoxy-D-xylulose 5-phosphate synthase (EC 2.2.1.7)"
reversible="false">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU24270</p>
        <p>GENE_LIST: BSU24270</p>
        <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00080_c"/>
      <speciesReference species="M_C00118_c"/>
      <speciesReference species="M_C00022_c"/>
    </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00011_c"/>
  <speciesReference species="M_C11437_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R05637" name="2-C-methyl-D-erythritol 2,4-cyclodiphosphate synthase (EC
4.6.1.12)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00910</p>
      <p>GENE_LIST: BSU00910</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C11436_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00055_c"/>
    <speciesReference species="M_C11453_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05661" name="5-keto-2-deoxygluconokinase (EC
2.7.1.92);5-keto-2-deoxygluconokinase B (EC 2.7.1.92)(BSU39750)" reversible="false">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: ( BSU39740 and BSU39750 )</p>
    <p>GENE_LIST: BSU39740 BSU39750</p>
    <p>SUBSYSTEM: Carbohydrates</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C06892_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C06893_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R05688" name="1-deoxy-D-xylulose 5-phosphate reductoisomerase (EC
1.1.1.267)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16550</p>
      <p>GENE_LIST: BSU16550</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C11434_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C11437_c"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R05706" name="Dihydropteridine reductase (EC
1.5.1.34)|Oxygen-insensitive NAD(P)H nitroreductase (EC 1.-.-.);NADPH-linked nitro/flavin
reductase [EC:1.-.-.](BSU38110)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU38110 or BSU07830 or BSU05660 or BSU05480 or
BSU19550 )</p>
      <p>GENE_LIST: BSU38110 BSU07830 BSU05660 BSU05480 BSU19550</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C00061_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C01847_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05707" name="Oxygen-insensitive NADPH nitroreductase (EC
1.-.-.);Dihydropteridine reductase (EC 1.5.1.34)|Oxygen-insensitive NAD(P)H nitroreductase

```

(EC 1.-.-)(BSU05480);Dihydropteridine reductase (EC 1.5.1.34)|Oxygen-insensitive NAD(P)H nitroreductase (EC 1.-.-)(BSU05660);Dihydropteridine reductase (EC 1.5.1.34)|Oxygen-insensitive NAD(P)H nitroreductase (EC 1.-.-)(BSU07830);Dihydropteridine reductase (EC 1.5.1.34)|Oxygen-insensitive NAD(P)H nitroreductase (EC 1.-.-)(BSU19550);NADPH-linked nitro/flavin reductase [EC:1.-.-](BSU38110)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU38110 or BSU07830 or BSU03860 or BSU05660 or BSU05480 or BSU19550 )</p>

<p>GENE\_LIST: BSU38110 BSU07830 BSU03860 BSU05660 BSU05480 BSU19550</p>

<p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00005\_c"/>

<speciesReference species="M\_C00255\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00006\_c"/>

<speciesReference species="M\_C01007\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_R05724" name="Flavohemoprotein (Hemoglobin-like protein) (Flavohemoglobin) (Nitric oxide dioxygenase) (EC 1.14.12.17)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU13040</p>

<p>GENE\_LIST: BSU13040</p>

<p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>

</html>

</notes>

```

<listOfReactants>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_C00007_c" stoichiometry="2"/>
  <speciesReference species="M_C00533_c" stoichiometry="2"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C00244_c" stoichiometry="2"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R05725" name="Flavohemoprotein (Hemoglobin-like protein)
(Flavohemoglobin) (Nitric oxide dioxygenase) (EC 1.14.12.17)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13040</p>
      <p>GENE_LIST: BSU13040</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C00007_c" stoichiometry="2"/>
    <speciesReference species="M_C00533_c" stoichiometry="2"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00244_c" stoichiometry="2"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```



```

    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05789" name="Probable 2-phosphosulfolactate phosphatase (EC 3.1.3.71)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU10940</p>
      <p>GENE_LIST: BSU10940</p>
      <p>SUBSYSTEM: Sulfur Metabolism</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C11536_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C11537_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R05835" name="Choloylglycine hydrolase (EC 3.5.1.24)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU39540</p>
      <p>GENE_LIST: BSU39540</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C01921_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00037_c"/>
  <speciesReference species="M_C00695_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R05850" name="L-ribulose-5-phosphate 4-epimerase (EC 5.1.3.4)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU28780</p>
      <p>GENE_LIST: BSU28780</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01101_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00231_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

<reaction id="R_R05861" name="Glycine oxidase ThiO (EC 1.4.3.19)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU11670</p>
      <p>GENE_LIST: BSU11670</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C00133_c"/>
    <speciesReference species="M_C00001_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00022_c"/>
    <speciesReference species="M_C00014_c"/>
    <speciesReference species="M_C00027_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

<reaction id="R_R05884" name="4-hydroxy-3-methylbut-2-enyl diphosphate reductase (EC
1.17.1.2)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25160</p>
      <p>GENE_LIST: BSU25160</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C11811_c"/>
  </listOfReactants>
  <listOfProducts>

```

```

    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00129_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R06063" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C11821_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C02348_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R06064" name="" reversible="false">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: </p>
  <p>GENE_LIST: </p>
  <p>SUBSYSTEM: Carbohydrates</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C11821_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00011_c"/>
  <speciesReference species="M_C02350_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R06180" name="D-malic enzyme (EC 1.1.1.83)|Tartrate decarboxylase (EC
4.1.1.73)|Tartrate dehydrogenase (EC 1.1.1.93)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU04000</p>
      <p>GENE_LIST: BSU04000</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00898_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C03459_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R06363" name="Probable beta-lactamase ybxI precursor (EC
3.5.2.6);Beta-lactamase class A(BSU18800);beta-lactamase(BSU01670)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU18800 or BSU02090 or BSU01670 )</p>
      <p>GENE_LIST: BSU18800 BSU02090 BSU01670</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00395_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C06567_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R06447" name="Undecaprenyl pyrophosphate synthetase (EC 2.5.1.31)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16530</p>
      <p>GENE_LIST: BSU16530</p>

```

```

    <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00129_c" stoichiometry="7"/>
  <speciesReference species="M_C11356_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00013_c" stoichiometry="7"/>
  <speciesReference species="M_C04574_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R06513" name="dTDP-glucose 4,6-dehydratase (EC 4.2.1.46)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37830</p>
      <p>GENE_LIST: BSU37830</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00842_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C11907_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R06514" name="dTDP-4-dehydrorhamnose 3,5-epimerase">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37810</p>
      <p>GENE_LIST: BSU37810</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C11907_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00688_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R06601" name="5-hydroxyisourate hydrolase (HIU hydrolase) (HIUHase)
(EC 3.5.2.17) (Transthyretin-related protein) (TRP)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32460</p>
      <p>GENE_LIST: BSU32460</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C11821_c"/>
    <speciesReference species="M_C00001_c"/>
  </listOfReactants>
  <listOfProducts>

```



```

    <speciesReference species="M_C12248_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R06602" name="Spore photoproduct lyase (EC 4.1.99.-)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13930</p>
      <p>GENE_LIST: BSU13930</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00885_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00022_c"/>
    <speciesReference species="M_C00805_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R06604" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>

```

```

    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C12248_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00011_c"/>
  <speciesReference species="M_C02350_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R06605" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C12248_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C02348_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R06613" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00143_c"/>
    <speciesReference species="M_C00365_c"/>
    <speciesReference species="M_C01352_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00364_c"/>
    <speciesReference species="M_C00101_c"/>
    <speciesReference species="M_C00016_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R06895" name="Coproporphyrinogen III oxidase, oxygen-independent (EC
1.3.99.22);Putative coproporphyrinogen III oxidase of BS HemN-type, oxygen-independent (EC
1.3.99.22), in heat shock gene cluster(BSU25500)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU25500 or BSU09840 )</p>
      <p>GENE_LIST: BSU25500 BSU09840</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C03263_c"/>
  <speciesReference species="M_C00019_c" stoichiometry="2"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00011_c" stoichiometry="2"/>
  <speciesReference species="M_C00073_c" stoichiometry="2"/>
  <speciesReference species="M_C01079_c"/>
  <speciesReference species="M_C05198_c" stoichiometry="2"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R06903" name="Spore photoproduct lyase (EC 4.1.99.-)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13930</p>
      <p>GENE_LIST: BSU13930</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00122_c"/>
    <speciesReference species="M_C14098_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C14115_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R06915" name="Salicylate hydroxylase (EC 1.14.13.1)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU07230</p>
      <p>GENE_LIST: BSU07230</p>
      <p>SUBSYSTEM: Metabolism of Aromatic Compounds</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C14088_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C02923_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R06936" name="Salicylate hydroxylase (EC 1.14.13.1)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU07230</p>
      <p>GENE_LIST: BSU07230</p>
      <p>SUBSYSTEM: Metabolism of Aromatic Compounds</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00080_c" stoichiometry="2"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_C00007_c"/>
  <speciesReference species="M_C14109_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00011_c"/>
  <speciesReference species="M_C14110_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R06939" name="Salicylate hydroxylase (EC 1.14.13.1)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU07230</p>
      <p>GENE_LIST: BSU07230</p>
      <p>SUBSYSTEM: Metabolism of Aromatic Compounds</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C14103_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C06730_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R06941" name="3-hydroxyacyl-CoA dehydrogenase (EC
1.1.1.35)|Enoyl-CoA hydratase [isoleucine degradation] (EC 4.2.1.17)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32840</p>
      <p>GENE_LIST: BSU32840</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C14145_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C02232_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R06974" name="Phosphoribosylglycinamide formyltransferase 2 (EC
2.1.2.-)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02230</p>

```

<p>GENE\_LIST: BSU02230</p>  
 <p>SUBSYSTEM: Nucleosides and Nucleotides</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00002\_c"/>  
 <speciesReference species="M\_C00058\_c"/>  
 <speciesReference species="M\_C03838\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00008\_c"/>  
 <speciesReference species="M\_C00009\_c"/>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C04376\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_R07013" name="Epoxide hydrolase (EC 3.3.2.9)">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: BSU08590</p>  
 <p>GENE\_LIST: BSU08590</p>  
 <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00001\_c"/>  
 <speciesReference species="M\_C14786\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C06205\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>



```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R07014" name="Epoxide hydrolase (EC 3.3.2.9)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08590</p>
      <p>GENE_LIST: BSU08590</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C14787_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C06205_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R07027" name="Epoxide hydrolase (EC 3.3.2.9)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08590</p>
      <p>GENE_LIST: BSU08590</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>

```

```

    <speciesReference species="M_C14800_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C14801_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R07082" name="Epoxide hydrolase (EC 3.3.2.9)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08590</p>
      <p>GENE_LIST: BSU08590</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C14850_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C14852_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R07176" name="Adenylyl-sulfate reductase [thioredoxin] (EC
1.8.4.10)|Phosphoadenylyl-sulfate reductase [thioredoxin] (EC 1.8.4.8)" reversible="false">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: ( BSU15570 or BSU10930 )</p>
    <p>GENE_LIST: BSU15570 BSU10930</p>
    <p>SUBSYSTEM: Sulfur Metabolism</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00342_c"/>
  <speciesReference species="M_C00224_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00020_c"/>
  <speciesReference species="M_C11481_c"/>
  <speciesReference species="M_C00343_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R07219" name="4-hydroxy-3-methylbut-2-enyl diphosphate reductase (EC
1.1.7.1.2)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25160</p>
      <p>GENE_LIST: BSU25160</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C11811_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00001_c"/>

```

```

    <speciesReference species="M_C00235_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R07262" name="2-succinyl-6-hydroxy-2,4-cyclohexadiene-1-carboxylate
synthase (EC 4.2.99.20);Alpha/beta hydrolase fold (EC 3.8.1.5)(BSU31420)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU31420 or BSU30810 )</p>
      <p>GENE_LIST: BSU31420 BSU30810</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C15547_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C03657_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R07263" name="Naphthoate synthase (EC 4.1.3.36)" reversible="false">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: BSU30800</p>
  <p>GENE_LIST: BSU30800</p>
  <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C03160_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C15547_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R07270" name="Phytoene synthase (EC 2.5.1.32)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU10810</p>
      <p>GENE_LIST: BSU10810</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C03427_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C05413_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R07280" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C04454_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C04732_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R07281" name="3,4-dihydroxy-2-butanone 4-phosphate synthase|GTP
cyclohydrolase II (EC 3.5.4.25)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU23260</p>
      <p>GENE_LIST: BSU23260</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00199_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00058_c"/>
  <speciesReference species="M_C15556_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R07316" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C01563_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00014_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

</kineticLaw>
</reaction>
<reaction id="R_R07346" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00794_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C00247_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R07355" name="Dihydropteridine reductase (EC
1.5.1.34)|Oxygen-insensitive NAD(P)H nitroreductase (EC 1.-.-.)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU07830 or BSU05660 or BSU05480 or
BSU19550 )</p>
      <p>GENE_LIST: BSU07830 BSU05660 BSU05480 BSU19550</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C05650_c"/>
  </listOfReactants>

```



```

<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00005_c"/>
  <speciesReference species="M_C05649_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R07363" name="1,2-dihydroxy-3-keto-5-methylthiopentene dioxygenase
(EC 1.13.11.54)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13620</p>
      <p>GENE_LIST: BSU13620</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C15606_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00058_c"/>
    <speciesReference species="M_C00237_c"/>
    <speciesReference species="M_C08276_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_R07364" name="1,2-dihydroxy-3-keto-5-methylthiopentene dioxygenase
(EC 1.13.11.54)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13620</p>
      <p>GENE_LIST: BSU13620</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C15606_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00058_c"/>
    <speciesReference species="M_C01180_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R07392" name="Methylthioribulose-1-phosphate dehydratase (EC
4.2.1.109)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13610</p>
      <p>GENE_LIST: BSU13610</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C04582_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>

```

```

    <speciesReference species="M_C15650_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R07393" name="2,3-diketo-5-methylthiopentyl-1-phosphate enolase"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13590</p>
      <p>GENE_LIST: BSU13590</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C15651_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C15650_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R07394" name="2-hydroxy-3-keto-5-methylthiopentenyl-1-phosphate
phosphatase" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

```

    <p>GENE_ASSOCIATION: BSU13600</p>
    <p>GENE_LIST: BSU13600</p>
    <p>SUBSYSTEM: Amino Acids and Derivatives</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C15651_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C15606_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R07396" name="Glutamine-dependent 2-keto-4-methylthiobutyrate
transaminase">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13580</p>
      <p>GENE_LIST: BSU13580</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01180_c"/>
    <speciesReference species="M_C00025_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00026_c"/>
    <speciesReference species="M_C00073_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R07406" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C07335_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C11638_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R07460" name="Putative cysteine desulfurase iscS 1 (EC 2.8.1.7);Putative
cysteine desulfurase nifS (EC 2.8.1.7)(BSU27880);Putative cysteine desulfurase iscS 2 (EC
2.8.1.7)(BSU29590)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU27510 or BSU27880 or BSU29590 )</p>
      <p>GENE_LIST: BSU27510 BSU27880 BSU29590</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>

```

```

    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C15811_c"/>
    <speciesReference species="M_C00097_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C15812_c"/>
    <speciesReference species="M_C00041_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R07475" name="Heptaprenyl diphosphate synthase component II (EC
2.5.1.30);Heptaprenyl diphosphate synthase component I (EC 2.5.1.30)(BSU22760)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU22740 and BSU22760 )</p>
      <p>GENE_LIST: BSU22740 BSU22760</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00129_c"/>
    <speciesReference species="M_C00353_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C04217_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R07476" name="Phosphosulfolactate synthase (EC 4.4.1.19)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU10950</p>
      <p>GENE_LIST: BSU10950</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C11536_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00074_c"/>
    <speciesReference species="M_C11481_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R07599" name="Branched-chain alpha-keto acid dehydrogenase, E1
component, beta subunit (EC 1.2.4.4);Branched-chain alpha-keto acid dehydrogenase, E1
component, alpha subunit (EC 1.2.4.4)(BSU24050)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU24040 and BSU24050 )</p>
      <p>GENE_LIST: BSU24040 BSU24050</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>

```

```

    <speciesReference species="M_C00068_c"/>
    <speciesReference species="M_C00141_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C15976_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R07600" name="Branched-chain alpha-keto acid dehydrogenase, E1
component, beta subunit (EC 1.2.4.4);Branched-chain alpha-keto acid dehydrogenase, E1
component, alpha subunit (EC 1.2.4.4)(BSU24050)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU24040 and BSU24050 )</p>
      <p>GENE_LIST: BSU24040 BSU24050</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C15972_c"/>
    <speciesReference species="M_C15976_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00068_c"/>
    <speciesReference species="M_C15977_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>

```



```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R07601" name="Branched-chain alpha-keto acid dehydrogenase, E1
component, beta subunit (EC 1.2.4.4);Branched-chain alpha-keto acid dehydrogenase, E1
component, alpha subunit (EC 1.2.4.4)(BSU24050)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU24040 and BSU24050 )</p>
      <p>GENE_LIST: BSU24040 BSU24050</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00068_c"/>
    <speciesReference species="M_C00233_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C15974_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R07602" name="Branched-chain alpha-keto acid dehydrogenase, E1
component, beta subunit (EC 1.2.4.4);Branched-chain alpha-keto acid dehydrogenase, E1
component, alpha subunit (EC 1.2.4.4)(BSU24050)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU24040 and BSU24050 )</p>
      <p>GENE_LIST: BSU24040 BSU24050</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C15972_c"/>
    <speciesReference species="M_C15974_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00068_c"/>
    <speciesReference species="M_C15975_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

<reaction id="R_R07603" name="Branched-chain alpha-keto acid dehydrogenase, E1
component, beta subunit (EC 1.2.4.4);Branched-chain alpha-keto acid dehydrogenase, E1
component, alpha subunit (EC 1.2.4.4)(BSU24050)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU24040 and BSU24050 )</p>
      <p>GENE_LIST: BSU24040 BSU24050</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00068_c"/>
    <speciesReference species="M_C00671_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C15978_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R07604" name="Branched-chain alpha-keto acid dehydrogenase, E1
component, beta subunit (EC 1.2.4.4);Branched-chain alpha-keto acid dehydrogenase, E1
component, alpha subunit (EC 1.2.4.4)(BSU24050)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU24040 and BSU24050 )</p>
      <p>GENE_LIST: BSU24040 BSU24050</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C15972_c"/>
    <speciesReference species="M_C15978_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00068_c"/>
    <speciesReference species="M_C15979_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R07618" name="Dihydrolipoamide dehydrogenase of pyruvate
dehydrogenase complex (EC 1.8.1.4);Dihydrolipoamide dehydrogenase of branched-chain
alpha-keto acid dehydrogenase (EC 1.8.1.4)(BSU24060)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU14610 or BSU24060 )</p>
      <p>GENE_LIST: BSU14610 BSU24060</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C15973_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C15972_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R07651" name="D-aminopeptidase">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU12920</p>
      <p>GENE_LIST: BSU12920</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00993_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00133_c" stoichiometry="2"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_R07770" name="Lipoate-protein ligase A" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU24530</p>
      <p>GENE_LIST: BSU24530</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00725_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C16238_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R07771" name="Lipoate-protein ligase A">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU24530</p>
      <p>GENE_LIST: BSU24530</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C16238_c"/>
    <speciesReference species="M_C16240_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00020_c"/>
  </listOfProducts>

```

```

    <speciesReference species="M_C16237_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R08056" name="Glucarate dehydratase (EC 4.2.1.40)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02490</p>
      <p>GENE_LIST: BSU02490</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00818_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C03921_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R08125" name="Fructoselysine 6-phosphate deglycase (EC 3.5.-.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32610</p>
      <p>GENE_LIST: BSU32610</p>

```

```

    <p>SUBSYSTEM: Amino Acids and Derivatives</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C16489_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00047_c"/>
  <speciesReference species="M_C00668_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R08166" name="2-succinyl-6-hydroxy-2,4-cyclohexadiene-1-carboxylate
synthase (EC 4.2.99.20)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30810</p>
      <p>GENE_LIST: BSU30810</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C16519_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00022_c"/>
    <speciesReference species="M_C05817_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_R08218" name="Seryl-tRNA synthetase" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU00130</p>
      <p>GENE_LIST: BSU00130</p>
      <p>SUBSYSTEM: Aminoacyl-tRNA biosynthesis</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00065_c"/>
    <speciesReference species="M_C16636_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C06481_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R08368" name="Purine nucleoside phosphorylase (EC 2.4.2.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU19630 or BSU23490 )</p>
      <p>GENE_LIST: BSU19630 BSU23490</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00009_c"/>

```



```

    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C15586_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00620_c"/>
    <speciesReference species="M_C15587_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R08386" name="N-hydroxyarylamine O-acetyltransferase (EC 2.3.1.118)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU34730</p>
      <p>GENE_LIST: BSU34730</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C02720_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C16684_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>

```

```

</kineticLaw>
</reaction>
<reaction id="R_R08871" name="Putative phosphinothricin acetyltransferase ywnH (PPT
N-acetyltransferase) (EC 2.3.1.183)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36560</p>
      <p>GENE_LIST: BSU36560</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C17962_c"/>
    <speciesReference species="M_C00024_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C17949_c"/>
    <speciesReference species="M_C00010_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R08938" name="Putative phosphinothricin acetyltransferase ywnH (PPT
N-acetyltransferase) (EC 2.3.1.183)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36560</p>
      <p>GENE_LIST: BSU36560</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C05042_c"/>
  </listOfReactants>
  <listOfProducts>

```

```

    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C17952_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn00399" name="Nitric oxide synthase oxygenase (EC 1.-.-.)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU07630</p>
      <p>GENE_LIST: BSU07630</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C00007_c" stoichiometry="3"/>
    <speciesReference species="M_C00062_c" stoichiometry="2"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00001_c" stoichiometry="2"/>
    <speciesReference species="M_C00327_c" stoichiometry="2"/>
    <speciesReference species="M_C00533_c" stoichiometry="2"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_rxn00418" name="Aminoglycoside 6-adenylyltransferase (EC 2.7.7.-)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU26790</p>
      <p>GENE_LIST: BSU26790</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00065_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C05820_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn00568" name="Nitrite reductase [NAD(P)H] small subunit (EC
1.7.1.4);Nitrite reductase [NAD(P)H] large subunit (EC 1.7.1.4)(BSU03300);Assimilatory nitrate
reductase large subunit (EC:1.7.99.4)(BSU03310);Nitrite reductase [NAD(P)H] large subunit (EC
1.7.1.4)(BSU03320)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU03290 and BSU03300 and BSU03310 and
BSU03320 )</p>
      <p>GENE_LIST: BSU03290 BSU03300 BSU03310 BSU03320</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="5"/>

```

```

    <speciesReference species="M_C00004_c" stoichiometry="3"/>
    <speciesReference species="M_C00088_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c" stoichiometry="3"/>
    <speciesReference species="M_C00001_c" stoichiometry="2"/>
    <speciesReference species="M_C00014_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn00569" name="Nitrite reductase [NAD(P)H] small subunit (EC
1.7.1.4);Nitrite reductase [NAD(P)H] large subunit (EC 1.7.1.4)(BSU03300);Assimilatory nitrate
reductase large subunit (EC:1.7.99.4)(BSU03310);Nitrite reductase [NAD(P)H] large subunit (EC
1.7.1.4)(BSU03320)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU03290 and BSU03300 and BSU03310 and
BSU03320 )</p>
      <p>GENE_LIST: BSU03290 BSU03300 BSU03310 BSU03320</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="5"/>
    <speciesReference species="M_C00005_c" stoichiometry="3"/>
    <speciesReference species="M_C00088_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c" stoichiometry="3"/>
    <speciesReference species="M_C00001_c" stoichiometry="2"/>
    <speciesReference species="M_C00014_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>

```

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn00734" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00007_c" stoichiometry="0.5"/>
    <speciesReference species="M_C00109_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C02876_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn00955" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>

```

```

    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C03539_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00155_c"/>
    <speciesReference species="M_C00121_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn01259" name="Oligo-1,6-glucosidase (EC 3.2.1.10);Neopullulanase (EC
3.2.1.135)(BSU34560)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU02840 or BSU34560 )</p>
      <p>GENE_LIST: BSU02840 BSU34560</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00252_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00267_c" stoichiometry="2"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```

```

        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn01923" name="Butyryl-CoA dehydrogenase (EC 1.3.99.2)"
reversible="false">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: BSU24150</p>
            <p>GENE_LIST: BSU24150</p>
            <p>SUBSYSTEM: Amino Acids and Derivatives</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00007_c"/>
        <speciesReference species="M_C00630_c" stoichiometry="2"/>
    </listOfReactants>
    <listOfProducts>
        <speciesReference species="M_C00001_c" stoichiometry="2"/>
        <speciesReference species="M_C03460_c" stoichiometry="2"/>
    </listOfProducts>
    <kineticLaw>
        <math xmlns="http://www.w3.org/1998/Math/MathML">
            <ci> FLUX_VALUE </ci>
        </math>
        <listOfParameters>
            <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
            <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
            <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
        </listOfParameters>
    </kineticLaw>
</reaction>
<reaction id="R_rxn02005" name="PTS system, trehalose-specific IIB component (EC
2.7.1.69)|PTS system, trehalose-specific IIC component (EC
2.7.1.69);Phosphoenolpyruvate-protein phosphotransferase of PTS system (EC
2.7.3.9)(BSU13910);Phosphocarrier protein of PTS system(BSU13900)" reversible="false">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: ( BSU13900 and BSU13910 and BSU07800 )</p>
            <p>GENE_LIST: BSU13900 BSU13910 BSU07800</p>
            <p>SUBSYSTEM: Membrane Transport</p>
        </html>
    </notes>
    <listOfReactants>

```



```

    <speciesReference species="M_C00074_c"/>
    <speciesReference species="M_C01083_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00022_c"/>
    <speciesReference species="M_C00689_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn02268" name="Butyryl-CoA dehydrogenase (EC 1.3.99.2)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU24150</p>
      <p>GENE_LIST: BSU24150</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C15980_c" stoichiometry="2"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c" stoichiometry="2"/>
    <speciesReference species="M_C03345_c" stoichiometry="2"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>

```

```

</kineticLaw>
</reaction>
<reaction id="R_rxn02727" name="Gamma-glutamyltranspeptidase (EC 2.3.2.2)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU18410</p>
      <p>GENE_LIST: BSU18410</p>
      <p>SUBSYSTEM: Sulfur Metabolism</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C02166_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C05951_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn03931" name="Epi-inositol hydrolase" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU39730</p>
      <p>GENE_LIST: BSU39730</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C04287_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C06892_c"/>
  </listOfProducts>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn04675"
name="2-succinyl-5-enolpyruvyl-6-hydroxy-3-cyclohexene-1-carboxylic-acid synthase (EC
2.2.1.9)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30820</p>
      <p>GENE_LIST: BSU30820</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00026_c"/>
    <speciesReference species="M_C00885_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00022_c"/>
    <speciesReference species="M_C05817_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05145" name="Phosphate transport ATP-binding protein PstB (TC

```

3.A.1.7.1);Putative periplasmic phosphate-binding protein PstS, Mycoplasma type(BSU24970);Phosphate transport system permease protein pstC (TC 3.A.1.7.1)(BSU24980);Phosphate ABC transporter, periplasmic phosphate-binding protein PstS (TC 3.A.1.7.1)(BSU24990)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU24950 and BSU24960 and BSU24970 and BSU24980 and BSU24990 )</p>

<p>GENE\_LIST: BSU24950 BSU24960 BSU24970 BSU24980 BSU24990</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00002\_c"/>

<speciesReference species="M\_C00009\_e"/>

<speciesReference species="M\_C00001\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00008\_c"/>

<speciesReference species="M\_C00009\_c" stoichiometry="2"/>

<speciesReference species="M\_C00080\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05147" name="Unspecified monosaccharide ABC transport system, ATP-binding protein;Multiple sugar ABC transporter, ATP-binding protein(BSU32550);Multiple sugar ABC transporter, substrate-binding protein(BSU30270);Multiple sugar ABC transporter, membrane-spanning permease protein MsmF(BSU30280);Multiple sugar ABC transporter, membrane-spanning permease protein MsmG(BSU30290);Unspecified monosaccharide ABC transport system, substrate-binding component(BSU31540);Unspecified monosaccharide ABC transport system, permease component Ia (FIG025991)|Unspecified monosaccharide ABC transport system, permease component Ib (FIG143636)(BSU31560);Unspecified monosaccharide ABC transport system, permease component 2(BSU31570);Multiple sugar ABC transporter, membrane-spanning permease protein MsmG(BSU32580);Multiple sugar ABC transporter, membrane-spanning permease protein MsmF(BSU32590);Multiple sugar ABC transporter,

```

substrate-binding protein(BSU32600)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU31540 and BSU31550 and BSU31560 and
BSU31570 ) or ( BSU30270 and BSU30280 and BSU30290 ) or ( BSU32550 and BSU32580 and
BSU32590 and BSU32600 ) )</p>
      <p>GENE_LIST: BSU31540 BSU31550 BSU31560 BSU31570 BSU30270 BSU30280
BSU30290 BSU32550 BSU32580 BSU32590 BSU32600</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00267_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00267_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05148" name="Ferrichrome transport ATP-binding protein FhuC (TC
3.A.1.14.3);Heme ABC type transporter HtsABC, permease protein HtsC(BSU07500);Heme ABC
type transporter HtsABC, permease protein HtsB(BSU07510);Heme ABC type transporter
HtsABC, heme-binding protein(BSU07520)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU07490 and BSU07500 and BSU07510 and
BSU07520 )</p>
      <p>GENE_LIST: BSU07490 BSU07500 BSU07510 BSU07520</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00032_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00032_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05149" name="Manganese ABC transporter, inner membrane permease protein SitD;Manganese ABC transporter, inner membrane permease protein SitC(BSU30750);Manganese ABC transporter, ATP-binding protein SitB(BSU30760);Manganese ABC transporter, periplasmic-binding protein SitA(BSU30770)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU30740 and BSU30750 and BSU30760 and BSU30770 )</p>
      <p>GENE_LIST: BSU30740 BSU30750 BSU30760 BSU30770</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00034_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
  </listOfProducts>

```

```

    <speciesReference species="M_C00034_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05150" name="Copper-translocating P-type ATPase (EC 3.6.3.4)|Lead,
cadmium, zinc and mercury transporting ATPase (EC 3.6.3.3) (EC 3.6.3.5);Zinc ABC transporter,
ATP-binding protein ZnuC(BSU02860);Zinc ABC transporter, periplasmic-binding protein
ZnuA(BSU02850);Zinc ABC transporter, inner membrane permease protein ZnuB(BSU02870)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU02850 and BSU02860 and BSU02870 ) or
BSU33490 or BSU13850 )</p>
      <p>GENE_LIST: BSU02850 BSU02860 BSU02870 BSU33490 BSU13850</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00038_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00038_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05155" name="Glutamine transport ATP-binding protein glnQ (TC
3.A.1.3.2);Glutamine ABC transporter, periplasmic glutamine-binding protein (TC
3.A.1.3.2)(BSU27440);Glutamine transport system permease protein glnP (TC
3.A.1.3.2)(BSU27450);Glutamine transport system permease protein glnP (TC
3.A.1.3.2)(BSU27460)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU27430 and BSU27440 and BSU27450 and
BSU27460 )</p>
      <p>GENE_LIST: BSU27430 BSU27440 BSU27450 BSU27460</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00064_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00064_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05159" name="Choline ABC transport system, permease protein
OpuBD;Choline ABC transport system, choline-binding protein OpuBC(BSU33710);Choline
ABC transport system, permease protein OpuBB(BSU33720);Choline ABC transport system,
ATP-binding protein OpuBA(BSU33730);Osmotically activated L-carnitine/choline ABC
transporter, permease protein OpuCD(BSU33800);Osmotically activated L-carnitine/choline ABC

```



transporter, substrate-binding protein OpuCC(BSU33810);Osmotically activated L-carnitine/choline ABC transporter, permease protein OpuCB(BSU33820);Osmotically activated L-carnitine/choline ABC transporter, ATP-binding protein OpuCA(BSU33830)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( ( BSU33700 and BSU33710 and BSU33720 and BSU33730 ) or ( BSU33800 and BSU33810 and BSU33820 and BSU33830 ) )</p>

<p>GENE\_LIST: BSU33700 BSU33710 BSU33720 BSU33730 BSU33800 BSU33810 BSU33820 BSU33830</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00002\_c"/>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_C00114\_e"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00008\_c"/>

<speciesReference species="M\_C00009\_c"/>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00114\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05160" name="Ribose ABC transport system, ATP-binding protein RbsA (TC 3.A.1.2.1);Unspecified monosaccharide ABC transport system, ATP-binding protein(BSU31550);Multiple sugar ABC transporter, ATP-binding protein(BSU32550);Ribose ABC transport system, high affinity permease RbsD (TC 3.A.1.2.1)(BSU35930);Multiple sugar ABC transporter, substrate-binding protein(BSU30270);Multiple sugar ABC transporter, membrane-spanning permease protein MsmF(BSU30280);Multiple sugar ABC transporter, membrane-spanning permease protein MsmG(BSU30290);Unspecified monosaccharide ABC transport system, substrate-binding component(BSU31540);Unspecified monosaccharide ABC transport system, permease component Ia (FIG025991)|Unspecified monosaccharide ABC

transport system, permease component Ib (FIG143636)(BSU31560);Unspecified monosaccharide ABC transport system, permease component 2(BSU31570);Multiple sugar ABC transporter, membrane-spanning permease protein MsmG(BSU32580);Multiple sugar ABC transporter, membrane-spanning permease protein MsmF(BSU32590);Multiple sugar ABC transporter, substrate-binding protein(BSU32600);Ribose ABC transport system, permease protein RbsC (TC 3.A.1.2.1)(BSU35950);Ribose ABC transport system, periplasmic ribose-binding protein RbsB (TC 3.A.1.2.1)(BSU35960)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( ( BSU35930 and BSU35940 and BSU35950 and BSU35960 ) or ( BSU31540 and BSU31550 and BSU31560 and BSU31570 ) or ( BSU30270 and BSU30280 and BSU30290 ) or ( BSU32550 and BSU32580 and BSU32590 and BSU32600 ) )</p>

<p>GENE\_LIST: BSU35930 BSU35940 BSU35950 BSU35960 BSU31540 BSU31550 BSU31560 BSU31570 BSU30270 BSU30280 BSU30290 BSU32550 BSU32580 BSU32590 BSU32600</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00002\_c"/>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_C00121\_e"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00008\_c"/>

<speciesReference species="M\_C00009\_c"/>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00121\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05162" name="Unspecified monosaccharide ABC transport system, ATP-binding protein;Multiple sugar ABC transporter, ATP-binding protein(BSU32550);Multiple sugar ABC transporter, substrate-binding protein(BSU30270);Multiple sugar ABC transporter,

membrane-spanning permease protein MsmF(BSU30280);Multiple sugar ABC transporter, membrane-spanning permease protein MsmG(BSU30290);Unspecified monosaccharide ABC transport system, substrate-binding component(BSU31540);Unspecified monosaccharide ABC transport system, permease component Ia (FIG025991)|Unspecified monosaccharide ABC transport system, permease component Ib (FIG143636)(BSU31560);Unspecified monosaccharide ABC transport system, permease component 2(BSU31570);Multiple sugar ABC transporter, membrane-spanning permease protein MsmG(BSU32580);Multiple sugar ABC transporter, membrane-spanning permease protein MsmF(BSU32590);Multiple sugar ABC transporter, substrate-binding protein(BSU32600)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( ( BSU31540 and BSU31550 and BSU31560 and BSU31570 ) or ( BSU30270 and BSU30280 and BSU30290 ) or ( BSU32550 and BSU32580 and BSU32590 and BSU32600 ) )</p>

<p>GENE\_LIST: BSU31540 BSU31550 BSU31560 BSU31570 BSU30270 BSU30280 BSU30290 BSU32550 BSU32580 BSU32590 BSU32600</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00002\_c"/>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_C00124\_e"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00008\_c"/>

<speciesReference species="M\_C00009\_c"/>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00124\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05164" name="Histidine ABC transporter, ATP-binding protein HisP (TC 3.A.1.3.1);Probable amino-acid ABC transporter permease protein ytmM(BSU29350);Probable amino-acid ABC transporter permease protein ytmM(BSU29360);putative periplasmic binding

```

transport protein(BSU29380)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU29340 and BSU29350 and BSU29360 and
BSU29380 )</p>
      <p>GENE_LIST: BSU29340 BSU29350 BSU29360 BSU29380</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00135_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00135_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05167" name="Unspecified monosaccharide ABC transport system,
ATP-binding protein;Multiple sugar ABC transporter, ATP-binding protein(BSU32550);Multiple
sugar ABC transporter, substrate-binding protein(BSU30270);Multiple sugar ABC transporter,
membrane-spanning permease protein MsmF(BSU30280);Multiple sugar ABC transporter,
membrane-spanning permease protein MsmG(BSU30290);Unspecified monosaccharide ABC
transport system, substrate-binding component(BSU31540);Unspecified monosaccharide ABC
transport system, permease component Ia (FIG025991)|Unspecified monosaccharide ABC
transport system, permease component Ib (FIG143636)(BSU31560);Unspecified monosaccharide
ABC transport system, permease component 2(BSU31570);Multiple sugar ABC transporter,
membrane-spanning permease protein MsmG(BSU32580);Multiple sugar ABC transporter,
membrane-spanning permease protein MsmF(BSU32590);Multiple sugar ABC transporter,
substrate-binding protein(BSU32600)" reversible="false">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: ( ( BSU31540 and BSU31550 and BSU31560 and
BSU31570 ) or ( BSU30270 and BSU30280 and BSU30290 ) or ( BSU32550 and BSU32580 and
BSU32590 and BSU32600 ) )</p>
  <p>GENE_LIST: BSU31540 BSU31550 BSU31560 BSU31570 BSU30270 BSU30280
BSU30290 BSU32550 BSU32580 BSU32590 BSU32600</p>
  <p>SUBSYSTEM: Membrane Transport</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00181_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00181_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05170" name="Predicted rhamnose oligosaccharide ABC transport
system, substrate-binding component;Predicted rhamnose oligosaccharide ABC transport system,
permease component 2(BSU06980);Predicted rhamnose oligosaccharide ABC transport system,
permease component(BSU06990);ABC-type polysaccharide transport system, permease
component(BSU07110)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU06970 and BSU06980 and BSU06990 ) or
BSU07110 )</p>
      <p>GENE_LIST: BSU06970 BSU06980 BSU06990 BSU07110</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00208_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00208_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05172" name="Alkanesulfonates ABC transporter ATP-binding
protein;Alkanesulfonates-binding protein(BSU08840);Alkanesulfonates transport
system permease protein(BSU08850)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU08830 and BSU08840 and BSU08850 )</p>
      <p>GENE_LIST: BSU08830 BSU08840 BSU08850</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00245_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00245_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05173" name="Unspecified monosaccharide ABC transport system,
ATP-binding protein;Multiple sugar ABC transporter, ATP-binding
protein(BSU32550);alpha-arabinosides ABC transport system, permease protein
araQ(BSU28730);alpha-arabinosides ABC transport system, permease protein
araP(BSU28740);alpha-arabinosides ABC transport system, substrate-binding protein
araN(BSU28750);Multiple sugar ABC transporter, substrate-binding protein(BSU30270);Multiple
sugar ABC transporter, membrane-spanning permease protein MsmF(BSU30280);Multiple sugar
ABC transporter, membrane-spanning permease protein MsmG(BSU30290);Unspecified
monosaccharide ABC transport system, substrate-binding component(BSU31540);Unspecified
monosaccharide ABC transport system, permease component Ia (FIG025991)|Unspecified
monosaccharide ABC transport system, permease component Ib
(FIG143636)(BSU31560);Unspecified monosaccharide ABC transport system, permease
component 2(BSU31570);Multiple sugar ABC transporter, membrane-spanning permease protein
MsmG(BSU32580);Multiple sugar ABC transporter, membrane-spanning permease protein
MsmF(BSU32590);Multiple sugar ABC transporter, substrate-binding protein(BSU32600)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU28730 and BSU28740 and BSU28750 ) or
( BSU30270 and BSU30280 and BSU30290 ) or ( BSU31540 and BSU31550 and BSU31560 and
BSU31570 ) or ( BSU32550 and BSU32580 and BSU32590 and BSU32600 ) )</p>
      <p>GENE_LIST: BSU28730 BSU28740 BSU28750 BSU30270 BSU30280 BSU30290
BSU31540 BSU31550 BSU31560 BSU31570 BSU32550 BSU32580 BSU32590 BSU32600</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00259_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>

```

```

    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00259_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05174" name="cation-transporting ATPase, E1-E2 family"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15650</p>
      <p>GENE_LIST: BSU15650</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00291_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00291_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```



</reaction>

<reaction id="R\_rxn05177" name="Duplicated ATPase component YkoD of energizing module of thiamin-regulated ECF transporter for HydroxyMethylPyrimidine;Transmembrane component YkoC of energizing module of thiamin-regulated ECF transporter for HydroxyMethylPyrimidine(BSU13210);Substrate-specific component YkoE of thiamin-regulated ECF transporter for HydroxyMethylPyrimidine(BSU13230);Additional substrate-binding component of thiamin-regulated ECF transporter for HydroxyMethylPyrimidine(BSU13240)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU13210 and BSU13220 and BSU13230 and BSU13240 )</p>

<p>GENE\_LIST: BSU13210 BSU13220 BSU13230 BSU13240</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00002\_c"/>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_C00378\_e"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00008\_c"/>

<speciesReference species="M\_C00009\_c"/>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00378\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05180" name="Osmotically activated L-carnitine/choline ABC transporter, permease protein OpuCD;Osmotically activated L-carnitine/choline ABC transporter, substrate-binding protein OpuCC(BSU33810);Osmotically activated L-carnitine/choline ABC transporter, permease protein OpuCB(BSU33820);Osmotically activated L-carnitine/choline ABC transporter, ATP-binding protein OpuCA(BSU33830)" reversible="false">

<notes>

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: ( BSU33800 and BSU33810 and BSU33820 and
BSU33830 )</p>
  <p>GENE_LIST: BSU33800 BSU33810 BSU33820 BSU33830</p>
  <p>SUBSYSTEM: Membrane Transport</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00487_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00487_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05181" name="Glycine betaine ABC transport system, ATP-binding
protein OpuAA (EC 3.6.3.32);Glycine betaine ABC transport system, permease protein
OpuAB(BSU02990);Glycine betaine ABC transport system, glycine betaine-binding protein
OpuAC(BSU03000)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU02980 and BSU02990 and BSU03000 )</p>
      <p>GENE_LIST: BSU02980 BSU02990 BSU03000</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00719_e"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00719_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05183" name="Methionine ABC transporter ATP-binding protein;ABC
transporter, ATP-binding protein(BSU09070);ABC transporter, ATP-binding
protein(BSU09080);Methionine ABC transporter substrate-binding protein(BSU09110);ABC
transporter, permease protein(BSU30410);ABC transporter, ATP-binding
protein(BSU30450);Methionine ABC transporter substrate-binding
protein(BSU32730);Methionine ABC transporter permease protein(BSU32740)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU32730 and BSU32740 and BSU32750 ) or
( BSU09070 and BSU09080 and BSU09110 ) or ( BSU30410 and BSU30420 and
BSU30450 ) )</p>
      <p>GENE_LIST: BSU32730 BSU32740 BSU32750 BSU09070 BSU09080 BSU09110
BSU30410 BSU30420 BSU30450</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00855_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>

```

```

    <speciesReference species="M_C00855_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

<reaction id="R_rxn05184" name="Choline ABC transport system, permease protein OpuBD;Choline ABC transport system, choline-binding protein OpuBC(BSU33710);Choline ABC transport system, permease protein OpuBB(BSU33720);Choline ABC transport system, ATP-binding protein OpuBA(BSU33730);Osmotically activated L-carnitine/choline ABC transporter, permease protein OpuCD(BSU33800);Osmotically activated L-carnitine/choline ABC transporter, substrate-binding protein OpuCC(BSU33810);Osmotically activated L-carnitine/choline ABC transporter, permease protein OpuCB(BSU33820);Osmotically activated L-carnitine/choline ABC transporter, ATP-binding protein OpuCA(BSU33830)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU33700 and BSU33710 and BSU33720 and BSU33730 ) or ( BSU33800 and BSU33810 and BSU33820 and BSU33830 ) )</p>
      <p>GENE_LIST: BSU33700 BSU33710 BSU33720 BSU33730 BSU33800 BSU33810 BSU33820 BSU33830</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00919_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00919_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05185" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01487_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01487_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05187" name="Adenosylcobinamide amidohydrolase (EC
3.5.1.90)|Vitamin B12 ABC transporter, ATPase component BtuD;Vitamin B12 ABC transporter,
permease component BtuC(BSU33170);Vitamin B12 ABC transporter, B12-binding component
BtuF(BSU33180)" reversible="false">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: ( BSU33160 and BSU33170 and BSU33180 )</p>
  <p>GENE_LIST: BSU33160 BSU33170 BSU33180</p>
  <p>SUBSYSTEM: Membrane Transport</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C05776_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C05776_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05188" name="Ferrichrome transport ATP-binding protein FhuC (TC
3.A.1.14.3);Ferrichrome transport system permease protein fhuG(BSU33300);Ferrichrome
transport system permease protein fhuB (TC 3.A.1.14.3)(BSU33310);Ferrichrome-binding
periplasmic protein precursor (TC 3.A.1.14.3)(BSU33320)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU33290 and BSU33300 and BSU33310 and
BSU33320 )</p>
      <p>GENE_LIST: BSU33290 BSU33300 BSU33310 BSU33320</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C06228_e"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C06228_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05192" name="Glycine betaine ABC transport system, ATP-binding
protein OpuAA (EC 3.6.3.32);Glycine betaine ABC transport system, permease protein
OpuAB(BSU02990);Glycine betaine ABC transport system, glycine betaine-binding protein
OpuAC(BSU03000)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU02980 and BSU02990 and BSU03000 )</p>
      <p>GENE_LIST: BSU02980 BSU02990 BSU03000</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C11458_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C11458_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05193" name="Glycine betaine ABC transport system, ATP-binding
protein OpuAA (EC 3.6.3.32);Glycine betaine ABC transport system, permease protein
OpuAB(BSU02990);Glycine betaine ABC transport system, glycine betaine-binding protein
OpuAC(BSU03000)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU02980 and BSU02990 and BSU03000 )</p>
      <p>GENE_LIST: BSU02980 BSU02990 BSU03000</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C11459_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C11459_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05194" name="Unspecified monosaccharide ABC transport system,
ATP-binding protein;Multiple sugar ABC transporter, ATP-binding protein(BSU32550);Multiple
sugar ABC transporter, substrate-binding protein(BSU30270);Multiple sugar ABC transporter,
membrane-spanning permease protein MsmF(BSU30280);Multiple sugar ABC transporter,

```



membrane-spanning permease protein MsmG(BSU30290);Unspecified monosaccharide ABC transport system, substrate-binding component(BSU31540);Unspecified monosaccharide ABC transport system, permease component Ia (FIG025991)|Unspecified monosaccharide ABC transport system, permease component Ib (FIG143636)(BSU31560);Unspecified monosaccharide ABC transport system, permease component 2(BSU31570);Multiple sugar ABC transporter, membrane-spanning permease protein MsmG(BSU32580);Multiple sugar ABC transporter, membrane-spanning permease protein MsmF(BSU32590);Multiple sugar ABC transporter, substrate-binding protein(BSU32600)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( ( BSU31540 and BSU31550 and BSU31560 and BSU31570 ) or ( BSU30270 and BSU30280 and BSU30290 ) or ( BSU32550 and BSU32580 and BSU32590 and BSU32600 ) )</p>

<p>GENE\_LIST: BSU31540 BSU31550 BSU31560 BSU31570 BSU30270 BSU30280 BSU30290 BSU32550 BSU32580 BSU32590 BSU32600</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00002\_c"/>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_C11546\_e"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00008\_c"/>

<speciesReference species="M\_C00009\_c"/>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C11546\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05195" name="Iron compound ABC uptake transporter ATP-binding protein;component of iron-uptake system(BSU01610);component of iron-uptake system(BSU01620);component of iron-uptake system(BSU01630);Iron compound ABC uptake transporter permease protein(BSU03800);Iron compound ABC uptake transporter permease

protein(BSU03810);Iron compound ABC uptake transporter substrate-binding protein(BSU03830)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( ( BSU03800 and BSU03810 and BSU03820 and BSU03830 ) or ( BSU01610 and BSU01620 and BSU01630 ) )</p>

<p>GENE\_LIST: BSU03800 BSU03810 BSU03820 BSU03830 BSU01610 BSU01620 BSU01630</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00002\_c"/>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_C14819\_e"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00008\_c"/>

<speciesReference species="M\_C00009\_c"/>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C14819\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05197" name="Xanthine/uracil/thiamine/ascorbate permease family protein;Uracil permease(BSU15480);Cytosine/purine/uracil/thiamine/allantoin permease family protein(BSU36470)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU15480 or BSU36470 or BSU06370 or BSU29990 )</p>

<p>GENE\_LIST: BSU15480 BSU36470 BSU06370 BSU29990</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

```

<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C00106_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00106_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05198" name="Nucleoside permease NupC;Nucleoside permease
nupC(BSU39020)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU32180 or BSU39020 or BSU39410 )</p>
      <p>GENE_LIST: BSU32180 BSU39020 BSU39410</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00475_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00475_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05199" name="Nucleoside permease NupC;Nucleoside permease
nupC(BSU39020)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU32180 or BSU39020 or BSU39410 )</p>
      <p>GENE_LIST: BSU32180 BSU39020 BSU39410</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00299_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00299_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05200" name="Nucleoside permease NupC;Nucleoside permease
nupC(BSU39020)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU32180 or BSU39020 or BSU39410 )</p>
      <p>GENE_LIST: BSU32180 BSU39020 BSU39410</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00214_e"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00214_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05201" name="Xanthine/uracil/thiamine/ascorbate permease family
protein;xanthine permease(BSU22060);Xanthine permease(BSU32430);Xanthine
permease(BSU32440);Xanthine permease(BSU37940)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU29990 or BSU06370 or ( BSU32430 and BSU32440 )
or BSU22060 or BSU37940 )</p>
      <p>GENE_LIST: BSU29990 BSU06370 BSU32430 BSU32440 BSU22060
BSU37940</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00262_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00262_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

</kineticLaw>
</reaction>
<reaction id="R_rxn05202" name="Xanthine/uracil/thiamine/ascorbate permease family
protein;xanthine permease(BSU22060);Xanthine permease(BSU32430);Xanthine
permease(BSU32440);Xanthine permease(BSU37940)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU22060 or ( BSU32430 and BSU32440 ) or BSU06370
or BSU29990 or BSU37940 )</p>
      <p>GENE_LIST: BSU22060 BSU32430 BSU32440 BSU06370 BSU29990
BSU37940</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00385_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00385_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05203" name="Cytosine/purine/uracil/thiamine/allantoin permease family
protein;Purine-cytosine permease(BSU38710)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU38710 or BSU36470 )</p>
      <p>GENE_LIST: BSU38710 BSU36470</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>

```

```

    <speciesReference species="M_C00242_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00242_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05204" name="Cytosine/purine/uracil/thiamine/allantoin permease family
protein;Purine-cytosine permease(BSU38710)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU38710 or BSU36470 )</p>
      <p>GENE_LIST: BSU38710 BSU36470</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00387_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00387_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_rxn05205" name="Nucleoside permease NupC;Nucleoside permease
nupC(BSU39020)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU39410 or BSU39020 or BSU32180 )</p>
      <p>GENE_LIST: BSU39410 BSU39020 BSU32180</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00881_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00881_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </kineticLaw>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</reaction>
<reaction id="R_rxn05206" name="Potassium efflux system KefA protein|Small-conductance
mechanosensitive channel">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU14210 or BSU07940 )</p>
      <p>GENE_LIST: BSU14210 BSU07940</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00238_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00238_c"/>
  </listOfProducts>

```



```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05207" name="Malate Na(+) symporter">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU31580 or BSU23560 )</p>
      <p>GENE_LIST: BSU31580 BSU23560</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01330_e"/>
    <speciesReference species="M_C00149_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C01330_c"/>
    <speciesReference species="M_C00149_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05209" name="Na(+) H(+) antiporter subunit E (TC 2.A.63.1.2);Na(+)
H(+) antiporter subunit A (TC 2.A.63.1.2)(BSU31600);Na(+) H(+) antiporter subunit B (TC
2.A.63.1.2)(BSU31610);Na(+) H(+) antiporter subunit C (TC 2.A.63.1.2)(BSU31620);Na(+) H(+)
antiporter subunit D (TC 2.A.63.1.2)(BSU31630);Na(+) H(+) antiporter subunit F (TC
2.A.63.1.2)(BSU31650);Na(+) H(+) antiporter subunit G (TC 2.A.63.1.2)(BSU31660)">
  <notes>

```

```

    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU31600 and BSU31610 and BSU31620 and BSU31630
and BSU31640 and BSU31650 and BSU31660 )</p>
      <p>GENE_LIST: BSU31600 BSU31610 BSU31620 BSU31630 BSU31640 BSU31650
BSU31660</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01330_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C01330_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05211" name="Citrate transporter;L-Malate Citrate symporter (TC
2.A.24.2.4)(BSU38770)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU26860 or BSU38770 )</p>
      <p>GENE_LIST: BSU26860 BSU38770</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00158_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00158_e"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05213" name="Ca(2+) Citrate symporter (TC 2.A.11.1.2)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU39060</p>
      <p>GENE_LIST: BSU39060</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00158_e"/>
    <speciesReference species="M_C00076_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00158_c"/>
    <speciesReference species="M_C00076_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05214" name="Mg(2+) Citrate transporter (TC 2.A.11.1.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU07610</p>

```

```

    <p>GENE_LIST: BSU07610</p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C00158_e"/>
  <speciesReference species="M_C00305_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00158_c"/>
  <speciesReference species="M_C00305_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05215" name="sodium/alanine symporter family protein">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU27810</p>
      <p>GENE_LIST: BSU27810</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01330_e"/>
    <speciesReference species="M_C00041_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C01330_c"/>
    <speciesReference species="M_C00041_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05216" name="Sodium/glutamine symporter glnT">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02420</p>
      <p>GENE_LIST: BSU02420</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01330_e"/>
    <speciesReference species="M_C00064_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C01330_c"/>
    <speciesReference species="M_C00064_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05217" name="Proton/aspartate symport protein|Proton/glutamate
symport protein">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02340</p>
      <p>GENE_LIST: BSU02340</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C00049_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00049_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05219" name="Methionine ABC transporter ATP-binding protein;ABC
transporter, ATP-binding protein(BSU09070);ABC transporter, ATP-binding
protein(BSU09080);Methionine ABC transporter substrate-binding protein(BSU09110);ABC
transporter, permease protein(BSU30410);ABC transporter, ATP-binding
protein(BSU30450);Methionine ABC transporter substrate-binding
protein(BSU32730);Methionine ABC transporter permease protein(BSU32740)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU32730 and BSU32740 and BSU32750 ) or
( BSU09070 and BSU09080 and BSU09110 ) or ( BSU30410 and BSU30420 and
BSU30450 ) )</p>
      <p>GENE_LIST: BSU32730 BSU32740 BSU32750 BSU09070 BSU09080 BSU09110
BSU30410 BSU30420 BSU30450</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00073_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>

```

```

    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00073_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05221" name="Proline/sodium symporter PutP (TC
2.A.21.2.1)|Propionate/sodium symporter;Sodium/proline symporter(BSU06660)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU06660 or BSU03220 )</p>
      <p>GENE_LIST: BSU06660 BSU03220</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01330_e"/>
    <speciesReference species="M_C00148_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C01330_c"/>
    <speciesReference species="M_C00148_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05223" name="Substrate-specific component BioY of biotin ECF
transporter" reversible="false">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: ( BSU10370 or BSU32030 )</p>
    <p>GENE_LIST: BSU10370 BSU32030</p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00120_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00120_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05226" name="PTS system, glucose-specific IIBC component (EC 2.7.1.69);PTS system, maltose and glucose-specific IIB component (EC 2.7.1.69)|PTS system, maltose and glucose-specific IIC component (EC 2.7.1.69)(BSU08200);Phosphoenolpyruvate-protein phosphotransferase of PTS system (EC 2.7.3.9)(BSU13910);PTS system, glucose-specific IIA component (EC 2.7.1.69)|PTS system, glucose-specific IIB component (EC 2.7.1.69)|PTS system, glucose-specific IIC component (EC 2.7.1.69)(BSU13890);PTS system, glucose-specific IIA component(BSU22230);Phosphocarrier protein of PTS system(BSU13900)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU13890 and BSU13900 and BSU13910 ) or ( BSU08200 and BSU13900 and BSU13910 ) or ( BSU01680 and BSU13900 and BSU13910 ) or ( BSU40120 and BSU13900 and BSU13910 ) or ( BSU22230 and BSU13900 and BSU13910 ) )</p>
      <p>GENE_LIST: BSU13890 BSU13900 BSU13910 BSU08200 BSU13900 BSU13910

```



BSU01680 BSU13900 BSU13910 BSU40120 BSU13900 BSU13910 BSU22230 BSU13900  
BSU13910</p>

<p>SUBSYSTEM: Membrane Transport</p>  
</html>  
</notes>  
<listOfReactants>  
<speciesReference species="M\_C00267\_e"/>  
<speciesReference species="M\_C00074\_c"/>  
</listOfReactants>  
<listOfProducts>  
<speciesReference species="M\_C00022\_c"/>  
<speciesReference species="M\_C00668\_c"/>  
</listOfProducts>  
<kineticLaw>  
<math xmlns="http://www.w3.org/1998/Math/MathML">  
<ci> FLUX\_VALUE </ci>  
</math>  
<listOfParameters>  
<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
</listOfParameters>  
</kineticLaw>  
</reaction>  
<reaction id="R\_rxn05229" name="Phosphoribosylaminoimidazole carboxylase catalytic  
subunit (EC 4.1.1.21);Phosphoribosylaminoimidazole carboxylase ATPase subunit (EC  
4.1.1.21)(BSU06430)" reversible="false">  
<notes>  
<html xmlns="http://www.w3.org/1999/xhtml">  
<p>GENE\_ASSOCIATION: ( BSU06420 and BSU06430 )</p>  
<p>GENE\_LIST: BSU06420 BSU06430</p>  
<p>SUBSYSTEM: Nucleosides and Nucleotides</p>  
</html>  
</notes>  
<listOfReactants>  
<speciesReference species="M\_C00002\_c"/>  
<speciesReference species="M\_C00288\_c"/>  
<speciesReference species="M\_C03373\_c"/>  
</listOfReactants>  
<listOfProducts>  
<speciesReference species="M\_C00008\_c"/>  
<speciesReference species="M\_C00009\_c"/>  
<speciesReference species="M\_C00080\_c"/>  
<speciesReference species="M\_C04751\_c"/>

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05237" name="amino acid ABC transporter, ATP-binding protein;amino
acid ABC transporter, permease protein(BSU39490);Cysteine ABC transporter, substrate-binding
protein(BSU39500)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU39480 and BSU39490 and BSU39500 )</p>
      <p>GENE_LIST: BSU39480 BSU39490 BSU39500</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00097_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00097_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

<reaction id="R\_rxn05243" name="Branched-chain amino acid transport system carrier protein;branched-chain amino acid transport(BSU26700);branched-chain amino acid transport(BSU26710)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( ( BSU26690 and BSU26700 and BSU26710 ) or BSU29600 )</p>

<p>GENE\_LIST: BSU26690 BSU26700 BSU26710 BSU29600</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_e"/>

<speciesReference species="M\_C00123\_e"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00123\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05244" name="Branched-chain amino acid transport system carrier protein;branched-chain amino acid transport(BSU26700);branched-chain amino acid transport(BSU26710)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( ( BSU26690 and BSU26700 and BSU26710 ) or BSU29600 )</p>

<p>GENE\_LIST: BSU26690 BSU26700 BSU26710 BSU29600</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_e"/>

<speciesReference species="M\_C00407\_e"/>

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00407_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05247" name="Long-chain-fatty-acid--CoA ligase (EC
6.2.1.3);Acetoacetyl-CoA synthetase [leucine] (EC 6.2.1.16)|Long-chain-fatty-acid--CoA ligase
(EC 6.2.1.3)(BSU18250)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU10270 or BSU28560 or BSU18250 or BSU10360 or
BSU17180 or BSU04170 )</p>
      <p>GENE_LIST: BSU10270 BSU28560 BSU18250 BSU10360 BSU17180
BSU04170</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd11430_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_cpd11435_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05248" name="Long-chain-fatty-acid--CoA ligase (EC
6.2.1.3);Acetoacetyl-CoA synthetase [leucine] (EC 6.2.1.16)|Long-chain-fatty-acid--CoA ligase
(EC 6.2.1.3)(BSU18250)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU10270 or BSU28560 or BSU18250 or BSU10360 or
BSU17180 or BSU04170 )</p>
      <p>GENE_LIST: BSU10270 BSU28560 BSU18250 BSU10360 BSU17180
BSU04170</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd11438_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_cpd11439_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05249" name="Long-chain-fatty-acid--CoA ligase (EC
6.2.1.3);Acetoacetyl-CoA synthetase [leucine] (EC 6.2.1.16)|Long-chain-fatty-acid--CoA ligase
(EC 6.2.1.3)(BSU18250)" reversible="false">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: ( BSU10270 or BSU28560 or BSU18250 or BSU10360 or
BSU17180 or BSU04170 )</p>
  <p>GENE_LIST:   BSU10270   BSU28560   BSU18250   BSU10360   BSU17180
BSU04170</p>
  <p>SUBSYSTEM: Fatty Acids and Lipids</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00010_c"/>
  <speciesReference species="M_cpd11436_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00013_c"/>
  <speciesReference species="M_C00020_c"/>
  <speciesReference species="M_cpd11437_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05250" name="Long-chain-fatty-acid--CoA ligase (EC
6.2.1.3);Acetoacetyl-CoA synthetase [leucine] (EC 6.2.1.16)|Long-chain-fatty-acid--CoA ligase
(EC 6.2.1.3)(BSU18250)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU10270 or BSU28560 or BSU18250 or BSU10360 or
BSU17180 or BSU04170 )</p>
      <p>GENE_LIST:   BSU10270   BSU28560   BSU18250   BSU10360   BSU17180
BSU04170</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>

```

```

    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd11440_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_cpd11441_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05251" name="Long-chain-fatty-acid--CoA ligase (EC
6.2.1.3);Acetoacetyl-CoA synthetase [leucine] (EC 6.2.1.16)|Long-chain-fatty-acid--CoA ligase
(EC 6.2.1.3)(BSU18250)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU10270 or BSU28560 or BSU18250 or BSU10360 or
BSU17180 or BSU04170 )</p>
      <p>GENE_LIST: BSU10270 BSU28560 BSU18250 BSU10360 BSU17180
BSU04170</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd11433_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_cpd11434_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05252" name="Long-chain-fatty-acid--CoA ligase (EC
6.2.1.3);Acetoacetyl-CoA synthetase [leucine] (EC 6.2.1.16)|Long-chain-fatty-acid--CoA ligase
(EC 6.2.1.3)(BSU18250)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU10270 or BSU28560 or BSU18250 or BSU10360 or
BSU17180 or BSU04170 )</p>
      <p>GENE_LIST: BSU10270 BSU28560 BSU18250 BSU10360 BSU17180
BSU04170</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd11431_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_cpd11432_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```



```

<reaction id="R_rxn05255" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00504_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00504_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

<reaction id="R_rxn05266" name="Ubiquinone/menaquinone biosynthesis methyltransferase
UbiE/COQ5 (EC 2.1.1.-)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU22750</p>
      <p>GENE_LIST: BSU22750</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_C00019_c"/>
    <speciesReference species="M_C05818_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00021_c"/>

```

```

    <speciesReference species="M_C00828_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05267" name="1,4-dihydroxy-2-naphthoate octaprenyltransferase (EC
2.5.1.-)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU38490</p>
      <p>GENE_LIST: BSU38490</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C04216_c"/>
    <speciesReference species="M_C03657_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C05818_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

<reaction id="R\_rxn05292" name="Ferrous iron transport peroxidase EfeB;Ferrous iron transport periplasmic protein EfeO(BSU38270)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU38260 and BSU38270 )</p>

<p>GENE\_LIST: BSU38260 BSU38270</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C14819\_e"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C14819\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05294" name="DNA polymerase III beta subunit;DNA gyrase subunit B(BSU00060);DNA gyrase subunit A(BSU00070);DNA polymerase III subunits gamma and Tau(BSU00190);DNA polymerase III delta prime subunit(BSU00310);DNA-cytosine methyltransferase (EC 2.1.1.37)(BSU06060);DNA ligase (EC 6.5.1.2)(BSU06620);ATP-dependent DNA ligase (EC 6.5.1.1) clustered with Ku protein, LigD(BSU13400);DNA topoisomerase I (EC 5.99.1.2)(BSU16120);DNA polymerase III alpha subunit (EC 2.7.7.7)(BSU16580);DNA polymerase III alpha subunit (EC 2.7.7.7)(BSU29230);Probable DNA polymerase yorL (EC 2.7.7.7)(BSU20340);ATP-dependent DNA ligase (EC 6.5.1.1)(BSU20500);DNA polymerase III delta subunit (EC 2.7.7.7)(BSU25560);Topoisomerase IV subunit B (EC 5.99.1.)(BSU18090);Topoisomerase IV subunit A (EC 5.99.1.)(BSU18100);DNA primase (EC 2.7.7.)(BSU25210);Replicative DNA helicase (EC 3.6.1.)(SA14-24)(BSU40440);ATP-dependent DNA helicase UvrD/PcrA(BSU06610);Helicase PriA essential for oriC/DnaA-independent DNA replication(BSU15710);Chromosomal replication initiator protein DnaA(BSU00010);Chromosome partition protein smc(BSU15940);Chromosome replication initiation protein dnaD(BSU22350);DNA-binding protein HBSu(BSU22790);Segregation and condensation protein B(BSU23210);Segregation and condensation protein A(BSU23220);Helicase loader DnaI(BSU28980);Helicase loader DnaB(BSU28990);Single-stranded DNA-binding

protein(BSU40900)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( ( BSU20340 and BSU00010 and BSU28990 and BSU40440 and BSU22350 and BSU29230 and BSU25210 and BSU28980 and BSU00020 and BSU00190 and BSU25560 and BSU00310 and BSU06620 and BSU06610 and BSU16580 and BSU15710 and BSU40900 and BSU00070 and BSU00060 and BSU22790 and BSU18100 and BSU18090 and BSU15940 and BSU16120 and BSU23220 and BSU23210 and BSU06060 and BSU20500 ) or ( BSU00010 and BSU28990 and BSU40440 and BSU22350 and BSU29230 and BSU25210 and BSU28980 and BSU00020 and BSU00190 and BSU25560 and BSU00310 and BSU06620 and BSU06610 and BSU16580 and BSU15710 and BSU40900 and BSU00070 and BSU00060 and BSU22790 and BSU18100 and BSU18090 and BSU15940 and BSU16120 and BSU23220 and BSU23210 and BSU06060 and BSU13400 ) )</p>

<p>GENE\_LIST: BSU20340 BSU00010 BSU28990 BSU40440 BSU22350 BSU29230 BSU25210 BSU28980 BSU00020 BSU00190 BSU25560 BSU00310 BSU06620 BSU06610 BSU16580 BSU15710 BSU40900 BSU00070 BSU00060 BSU22790 BSU18100 BSU18090 BSU15940 BSU16120 BSU23220 BSU23210 BSU06060 BSU20500 BSU00010 BSU28990 BSU40440 BSU22350 BSU29230 BSU25210 BSU28980 BSU00020 BSU00190 BSU25560 BSU00310 BSU06620 BSU06610 BSU16580 BSU15710 BSU40900 BSU00070 BSU00060 BSU22790 BSU18100 BSU18090 BSU15940 BSU16120 BSU23220 BSU23210 BSU06060 BSU13400</p>

<p>SUBSYSTEM: Macromolecular Synthesis</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00458\_c" stoichiometry="0.6684"/>

<speciesReference species="M\_C00459\_c" stoichiometry="0.8807"/>

<speciesReference species="M\_C00286\_c" stoichiometry="0.6692"/>

<speciesReference species="M\_C00131\_c" stoichiometry="0.884"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00013\_c" stoichiometry="3.1023"/>

<speciesReference species="M\_C00039\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05295" name="DNA-directed RNA polymerase beta subunit (EC 2.7.7.6);DNA-directed RNA polymerase beta' subunit (EC 2.7.7.6)(BSU01080);DNA-directed RNA polymerase alpha subunit (EC 2.7.7.6)(BSU01430);Ribonuclease III (EC 3.1.26.3)(BSU15930);tRNA (Guanine37-N1) -methyltransferase (EC 2.1.1.31)(BSU16030);Ribonuclease P protein component (EC 3.1.26.5)(BSU41050);DNA-directed RNA polymerase subunit omega (RNAP omega subunit) (EC 2.7.7.6) (Transcriptase subunit omega) (RNA polymerase omega subunit)(BSU15690);tRNA (5-methylaminomethyl-2-thiouridylate)-methyltransferase (EC 2.1.1.61)(BSU27500);tRNA (cytosine34-2'-O-)-methyltransferase (EC 2.1.1.-)(BSU08930);DNA-directed RNA polymerase subunit delta(BSU37160);tRNA nucleotidyltransferase (EC 2.7.7.25)(BSU22450);Two-component sensor kinase SA14-24(BSU40400);Sigma-M negative effector(BSU09510);Transcription termination protein NusA(BSU16600);RNA polymerase sigma factor RpoD(BSU25200);Two-component response regulator SA14-24(BSU40410)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU01430 and BSU01070 and BSU01080 and BSU25200 and BSU22450 and BSU08930 and BSU15930 and BSU41050 and BSU16030 and BSU27500 and BSU40410 and BSU40400 and BSU09510 and BSU16600 and BSU15690 )</p>

<p>GENE\_LIST: BSU01430 BSU01070 BSU01080 BSU25200 BSU22450 BSU08930 BSU15930 BSU41050 BSU16030 BSU27500 BSU40410 BSU40400 BSU09510 BSU16600 BSU15690</p>

<p>SUBSYSTEM: Macromolecular Synthesis</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00002\_c" stoichiometry="0.7706"/>

<speciesReference species="M\_C00063\_c" stoichiometry="0.5853"/>

<speciesReference species="M\_C00044\_c" stoichiometry="0.9496"/>

<speciesReference species="M\_C00075\_c" stoichiometry="0.6331"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00013\_c" stoichiometry="2.9386"/>

<speciesReference species="M\_cpd11462\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05297" name="Proton/aspartate symport protein|Proton/glutamate
symport protein;Proton/glutamate symport protein|Sodium/glutamate symport
protein(BSU10220)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU10220 or BSU02340 )</p>
      <p>GENE_LIST: BSU10220 BSU02340</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00025_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00025_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05298" name="Proton/sodium-glutamate symport
protein;Proton/glutamate symport protein|Sodium/glutamate symport protein(BSU10220)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU09130 or BSU10220 )</p>
      <p>GENE_LIST: BSU09130 BSU10220</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01330_e"/>
    <speciesReference species="M_C00025_e"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C01330_c"/>
  <speciesReference species="M_C00025_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05299" name="Histidine transport protein (permease)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU39390</p>
      <p>GENE_LIST: BSU39390</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00135_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00135_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05300" name="">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C00188_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00188_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05301" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00082_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00082_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```



```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05303" name="Arginine/ornithine antiporter ArcD;Arginine permease
RocE(BSU37760);Arginine permease RocE(BSU40330)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU33330 or BSU37760 or BSU40330 )</p>
      <p>GENE_LIST: BSU33330 BSU37760 BSU40330</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00062_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00062_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05304" name="amino acid ABC transporter, ATP-binding protein;amino
acid ABC transporter, permease protein(BSU39490);Cysteine ABC transporter, substrate-binding
protein(BSU39500)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU39480 and BSU39490 and BSU39500 )</p>
      <p>GENE_LIST: BSU39480 BSU39490 BSU39500</p>

```

```

    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00491_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00491_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05305" name="Transporter, LysE family">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU10870</p>
      <p>GENE_LIST: BSU10870</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00047_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00047_e"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </kineticLaw>
</reaction>

```

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05307" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00065_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00065_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05308" name="Putative symporter yjcG">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU38240</p>
      <p>GENE_LIST: BSU38240</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00864_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00864_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05310" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00253_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00253_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05312" name="Probable low-affinity inorganic phosphate transporter"

```

```

reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU12840</p>
      <p>GENE_LIST: BSU12840</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_e"/>
    <speciesReference species="M_C00080_e"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05313" name="Sodium-dependent phosphate transporter">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25420</p>
      <p>GENE_LIST: BSU25420</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00009_e"/>
    <speciesReference species="M_C01330_e" stoichiometry="3"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C01330_c" stoichiometry="3"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05315" name="Cobalt-zinc-cadmium resistance protein CzcD">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU26650</p>
      <p>GENE_LIST: BSU26650</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00038_c"/>
    <speciesReference species="M_C00238_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00038_e"/>
    <speciesReference species="M_C00238_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05316" name="Cytosine/purine/uracil/thiamine/allantoin permease family
protein;Purine-cytosine permease(BSU38710)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU38710 or BSU36470 )</p>

```

<p>GENE\_LIST: BSU38710 BSU36470</p>  
 <p>SUBSYSTEM: Membrane Transport</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00080\_e"/>  
 <speciesReference species="M\_C00294\_e"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00294\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_rxn05317" name="Cytosine/purine/uracil/thiamine/allantoin permease family protein;Purine-cytosine permease(BSU38710)">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: ( BSU38710 or BSU36470 )</p>  
 <p>GENE\_LIST: BSU38710 BSU36470</p>  
 <p>SUBSYSTEM: Membrane Transport</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00080\_e"/>  
 <speciesReference species="M\_C00559\_e"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00559\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>

```

    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05318" name="Cytosine/purine/uracil/thiamine/allantoin permease family
protein;Purine-cytosine permease(BSU38710)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU38710 or BSU36470 )</p>
      <p>GENE_LIST: BSU38710 BSU36470</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00212_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00212_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05319" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>

```



```

    <speciesReference species="M_C00001_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_e"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05358" name="Malonyl CoA-acyl carrier protein transacylase (EC
2.3.1.39)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15900</p>
      <p>GENE_LIST: BSU15900</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_C15980_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd11495_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

<reaction id="R\_rxn05359" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC 2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC 2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC 2.3.1.41)(BSU11340)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and BSU11340 ) )</p>

<p>GENE\_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C01209\_c"/>

<speciesReference species="M\_cpd11495\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00011\_c"/>

<speciesReference species="M\_C00229\_c"/>

<speciesReference species="M\_cpd11496\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05360" name="3-oxoacyl-[acyl-carrier protein] reductase (EC 1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein] reductase(BSU29420)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>

<p>GENE\_LIST: BSU15910 BSU16870 BSU29420</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

```

    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11496_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11497_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05361" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase
(EC 4.2.1.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36370</p>
      <p>GENE_LIST: BSU36370</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11497_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11498_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>

```

```

</kineticLaw>
</reaction>
<reaction id="R_rxn05362" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11498_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11499_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05363" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC
2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC
2.3.1.41)(BSU11340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and
BSU11340 ) )</p>
      <p>GENE_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01209_c"/>
    <speciesReference species="M_cpd11499_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_cpd11500_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05364" name="3-oxoacyl-[acyl-carrier protein] reductase (EC
1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein]
reductase(BSU29420)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>
      <p>GENE_LIST: BSU15910 BSU16870 BSU29420</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11500_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11501_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05365" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase
(EC 4.2.1.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36370</p>
      <p>GENE_LIST: BSU36370</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11501_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11502_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05366" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>

```

```

    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11502_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11503_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05367" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC
2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC
2.3.1.41)(BSU11340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and
BSU11340 ) )</p>
      <p>GENE_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01209_c"/>
    <speciesReference species="M_cpd11503_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_cpd11504_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05368" name="3-oxoacyl-[acyl-carrier protein] reductase (EC
1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein]
reductase(BSU29420)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>
      <p>GENE_LIST: BSU15910 BSU16870 BSU29420</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11504_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11505_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05369" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase
(EC 4.2.1.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36370</p>
      <p>GENE_LIST: BSU36370</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>

```



```

    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11505_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11506_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05370" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11506_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11507_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05371" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC
2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC
2.3.1.41)(BSU11340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and
BSU11340 ) )</p>
      <p>GENE_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01209_c"/>
    <speciesReference species="M_cpd11507_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_cpd11508_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05372" name="3-oxoacyl-[acyl-carrier protein] reductase (EC
1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein]
reductase(BSU29420)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>

```

<p>GENE\_LIST: BSU15910 BSU16870 BSU29420</p>  
 <p>SUBSYSTEM: Fatty Acids and Lipids</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00005\_c"/>  
 <speciesReference species="M\_cpd11508\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00006\_c"/>  
 <speciesReference species="M\_cpd11509\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_rxn05373" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase  
 (EC 4.2.1.-)">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: BSU36370</p>  
 <p>GENE\_LIST: BSU36370</p>  
 <p>SUBSYSTEM: Fatty Acids and Lipids</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_cpd11509\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00001\_c"/>  
 <speciesReference species="M\_cpd11510\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05374" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11510_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11511_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </kineticLaw>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05375" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC
2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC
2.3.1.41)(BSU11340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and
BSU11340 ) )</p>

```

<p>GENE\_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>
</notes>
<listOfReactants>
<speciesReference species="M\_C00080\_c"/>
<speciesReference species="M\_C01209\_c"/>
<speciesReference species="M\_cpd11511\_c"/>
</listOfReactants>
<listOfProducts>
<speciesReference species="M\_C00011\_c"/>
<speciesReference species="M\_C00229\_c"/>
<speciesReference species="M\_cpd11512\_c"/>
</listOfProducts>
<kineticLaw>
<math xmlns="http://www.w3.org/1998/Math/MathML">
<ci> FLUX\_VALUE </ci>
</math>
<listOfParameters>
<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>
<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>
<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R\_rxn05376" name="3-oxoacyl-[acyl-carrier protein] reductase (EC 1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein] reductase(BSU29420)">
<notes>
<html xmlns="http://www.w3.org/1999/xhtml">
<p>GENE\_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>
<p>GENE\_LIST: BSU15910 BSU16870 BSU29420</p>
<p>SUBSYSTEM: Fatty Acids and Lipids</p>
</html>
</notes>
<listOfReactants>
<speciesReference species="M\_C00080\_c"/>
<speciesReference species="M\_C00005\_c"/>
<speciesReference species="M\_cpd11512\_c"/>
</listOfReactants>
<listOfProducts>
<speciesReference species="M\_C00006\_c"/>
<speciesReference species="M\_cpd11513\_c"/>
</listOfProducts>

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05377" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase
(EC 4.2.1.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36370</p>
      <p>GENE_LIST: BSU36370</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11513_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11514_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05378" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>

```

<p>SUBSYSTEM: Fatty Acids and Lipids</p>  
</html>  
</notes>  
<listOfReactants>  
<speciesReference species="M\_C00080\_c"/>  
<speciesReference species="M\_C00005\_c"/>  
<speciesReference species="M\_cpd11514\_c"/>  
</listOfReactants>  
<listOfProducts>  
<speciesReference species="M\_C00006\_c"/>  
<speciesReference species="M\_cpd11515\_c"/>  
</listOfProducts>  
<kineticLaw>  
<math xmlns="http://www.w3.org/1998/Math/MathML">  
<ci> FLUX\_VALUE </ci>  
</math>  
<listOfParameters>  
<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
</listOfParameters>  
</kineticLaw>  
</reaction>  
<reaction id="R\_rxn05379" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC 2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC 2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC 2.3.1.41)(BSU11340)" reversible="false">  
<notes>  
<html xmlns="http://www.w3.org/1999/xhtml">  
<p>GENE\_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and BSU11340 ) )</p>  
<p>GENE\_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>  
<p>SUBSYSTEM: Fatty Acids and Lipids</p>  
</html>  
</notes>  
<listOfReactants>  
<speciesReference species="M\_C00080\_c"/>  
<speciesReference species="M\_C01209\_c"/>  
<speciesReference species="M\_cpd11515\_c"/>  
</listOfReactants>  
<listOfProducts>  
<speciesReference species="M\_C00011\_c"/>  
<speciesReference species="M\_C00229\_c"/>  
<speciesReference species="M\_cpd11516\_c"/>

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05380" name="3-oxoacyl-[acyl-carrier protein] reductase (EC
1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein]
reductase(BSU29420)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>
      <p>GENE_LIST: BSU15910 BSU16870 BSU29420</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11516_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11517_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05381" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase
(EC 4.2.1.-)">

```



```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: BSU36370</p>
    <p>GENE_LIST: BSU36370</p>
    <p>SUBSYSTEM: Fatty Acids and Lipids</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_cpd11517_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_cpd11518_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05382" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11518_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11519_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05383" name="Malonyl CoA-acyl carrier protein transacylase (EC
2.3.1.39)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15900</p>
      <p>GENE_LIST: BSU15900</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_C02939_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd11520_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05384" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC
2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC
2.3.1.41)(BSU11340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

<p>GENE\_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and BSU11340 ) )</p>

<p>GENE\_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_cpd11520\_c"/>

<speciesReference species="M\_C01209\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00011\_c"/>

<speciesReference species="M\_C00229\_c"/>

<speciesReference species="M\_cpd11521\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05385" name="3-oxoacyl-[acyl-carrier protein] reductase (EC 1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein] reductase(BSU29420)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>

<p>GENE\_LIST: BSU15910 BSU16870 BSU29420</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00005\_c"/>

<speciesReference species="M\_cpd11521\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00006\_c"/>

```

    <speciesReference species="M_cpd11522_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05386" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase
(EC 4.2.1.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36370</p>
      <p>GENE_LIST: BSU36370</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11522_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11523_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05387" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

<p>GENE\_ASSOCIATION: BSU08650</p>  
 <p>GENE\_LIST: BSU08650</p>  
 <p>SUBSYSTEM: Fatty Acids and Lipids</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00005\_c"/>  
 <speciesReference species="M\_cpd11523\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00006\_c"/>  
 <speciesReference species="M\_cpd11524\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_rxn05388" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC 2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC 2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC 2.3.1.41)(BSU11340)" reversible="false">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and BSU11340 ) )</p>  
 <p>GENE\_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>  
 <p>SUBSYSTEM: Fatty Acids and Lipids</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C01209\_c"/>  
 <speciesReference species="M\_cpd11524\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00011\_c"/>

```

    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_cpd11525_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05389" name="3-oxoacyl-[acyl-carrier protein] reductase (EC
1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein]
reductase(BSU29420)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>
      <p>GENE_LIST: BSU15910 BSU16870 BSU29420</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11525_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11526_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

<reaction id="R\_rxn05390" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase (EC 4.2.1.-)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU36370</p>

<p>GENE\_LIST: BSU36370</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_cpd11526\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_cpd11527\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05391" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC 1.3.1.10)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU08650</p>

<p>GENE\_LIST: BSU08650</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00005\_c"/>

<speciesReference species="M\_cpd11527\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00006\_c"/>

<speciesReference species="M\_cpd11528\_c"/>

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05392" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC
2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC
2.3.1.41)(BSU11340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and
BSU11340 ) )</p>
      <p>GENE_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd11528_c"/>
    <speciesReference species="M_C01209_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_cpd11529_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```



```

</reaction>
<reaction id="R_rxn05393" name="3-oxoacyl-[acyl-carrier protein] reductase (EC
1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein]
reductase(BSU29420)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>
      <p>GENE_LIST: BSU15910 BSU16870 BSU29420</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11529_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11530_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05394" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase
(EC 4.2.1.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36370</p>
      <p>GENE_LIST: BSU36370</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11530_c"/>
  </listOfReactants>
  <listOfProducts>

```

```

    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11531_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05395" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11531_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11532_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05396" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC

```

2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC  
 2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC  
 2.3.1.41)(BSU11340)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and  
 BSU11340 ) )</p>

<p>GENE\_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_cpd11532\_c"/>

<speciesReference species="M\_C01209\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00011\_c"/>

<speciesReference species="M\_C00229\_c"/>

<speciesReference species="M\_cpd11533\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05397" name="3-oxoacyl-[acyl-carrier protein] reductase (EC  
 1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein]  
 reductase(BSU29420)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>

<p>GENE\_LIST: BSU15910 BSU16870 BSU29420</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

```

    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11533_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11534_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05398" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase
(EC 4.2.1.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36370</p>
      <p>GENE_LIST: BSU36370</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11534_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11535_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_rxn05399" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11535_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11536_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05400" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC
2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC
2.3.1.41)(BSU11340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and
BSU11340 ) )</p>
      <p>GENE_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>

```

```

    <speciesReference species="M_C01209_c"/>
    <speciesReference species="M_cpd11536_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_cpd11537_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05401" name="3-oxoacyl-[acyl-carrier protein] reductase (EC
1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein]
reductase(BSU29420)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>
      <p>GENE_LIST: BSU15910 BSU16870 BSU29420</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11537_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11538_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05402" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase
(EC 4.2.1.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36370</p>
      <p>GENE_LIST: BSU36370</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11538_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11539_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05403" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>

```

```

    <speciesReference species="M_cpd11539_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11540_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05404" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC
2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC
2.3.1.41)(BSU11340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and
BSU11340 ) )</p>
      <p>GENE_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01209_c"/>
    <speciesReference species="M_cpd11540_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_cpd11541_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```



```

    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05405" name="3-oxoacyl-[acyl-carrier protein] reductase (EC
1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein]
reductase(BSU29420)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>
      <p>GENE_LIST: BSU15910 BSU16870 BSU29420</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11541_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11542_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05406" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase
(EC 4.2.1.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36370</p>
      <p>GENE_LIST: BSU36370</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_cpd11542_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_cpd11543_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05407" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11543_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11544_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05408" name="Malonyl CoA-acyl carrier protein transacylase (EC
2.3.1.39)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15900</p>
      <p>GENE_LIST: BSU15900</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00630_c"/>
    <speciesReference species="M_C00229_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd11545_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05409" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC
2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC
2.3.1.41)(BSU11340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and
BSU11340 ) )</p>
      <p>GENE_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_cpd11545_c"/>
  <speciesReference species="M_C01209_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00011_c"/>
  <speciesReference species="M_C00229_c"/>
  <speciesReference species="M_cpd11546_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05410" name="3-oxoacyl-[acyl-carrier protein] reductase (EC
1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein]
reductase(BSU29420)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>
      <p>GENE_LIST: BSU15910 BSU16870 BSU29420</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11546_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11547_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05411" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase
(EC 4.2.1.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36370</p>
      <p>GENE_LIST: BSU36370</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11547_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11548_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05412" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11548_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11549_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05413" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC
2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC
2.3.1.41)(BSU11340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and
BSU11340 ) )</p>
      <p>GENE_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd11549_c"/>
    <speciesReference species="M_C01209_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_cpd11550_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>

```

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05414" name="3-oxoacyl-[acyl-carrier protein] reductase (EC
1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein]
reductase(BSU29420)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>
      <p>GENE_LIST: BSU15910 BSU16870 BSU29420</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11550_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11551_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05415" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase
(EC 4.2.1.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36370</p>
      <p>GENE_LIST: BSU36370</p>

```

```

    <p>SUBSYSTEM: Fatty Acids and Lipids</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_cpd11551_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_cpd11552_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05416" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11552_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11553_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```



```

    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05417" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC
2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC
2.3.1.41)(BSU11340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and
BSU11340 ) )</p>
      <p>GENE_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01209_c"/>
    <speciesReference species="M_cpd11553_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_cpd11554_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05418" name="3-oxoacyl-[acyl-carrier protein] reductase (EC
1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein]
reductase(BSU29420)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

<p>GENE\_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>  
 <p>GENE\_LIST: BSU15910 BSU16870 BSU29420</p>  
 <p>SUBSYSTEM: Fatty Acids and Lipids</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00005\_c"/>  
 <speciesReference species="M\_cpd11554\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00006\_c"/>  
 <speciesReference species="M\_cpd11555\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_rxn05419" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase  
 (EC 4.2.1.-)">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: BSU36370</p>  
 <p>GENE\_LIST: BSU36370</p>  
 <p>SUBSYSTEM: Fatty Acids and Lipids</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_cpd11555\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00001\_c"/>  
 <speciesReference species="M\_cpd11556\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05420" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11556_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11557_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05421" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC
2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC
2.3.1.41)(BSU11340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and

```

BSU11340 ) )</p>  
 <p>GENE\_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>  
 <p>SUBSYSTEM: Fatty Acids and Lipids</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C01209\_c"/>  
 <speciesReference species="M\_cpd11557\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00011\_c"/>  
 <speciesReference species="M\_C00229\_c"/>  
 <speciesReference species="M\_cpd11558\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_rxn05422" name="3-oxoacyl-[acyl-carrier protein] reductase (EC 1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein] reductase(BSU29420)">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>  
 <p>GENE\_LIST: BSU15910 BSU16870 BSU29420</p>  
 <p>SUBSYSTEM: Fatty Acids and Lipids</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00005\_c"/>  
 <speciesReference species="M\_cpd11558\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00006\_c"/>  
 <speciesReference species="M\_cpd11559\_c"/>

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05423" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase
(EC 4.2.1.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36370</p>
      <p>GENE_LIST: BSU36370</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11559_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11560_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05424" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>

```

<p>GENE\_LIST: BSU08650</p>  
 <p>SUBSYSTEM: Fatty Acids and Lipids</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00005\_c"/>  
 <speciesReference species="M\_cpd11560\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00006\_c"/>  
 <speciesReference species="M\_cpd11561\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_rxn05425" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC 2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC 2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC 2.3.1.41)(BSU11340)" reversible="false">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and BSU11340 ) )</p>  
 <p>GENE\_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>  
 <p>SUBSYSTEM: Fatty Acids and Lipids</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_cpd11561\_c"/>  
 <speciesReference species="M\_C01209\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00011\_c"/>  
 <speciesReference species="M\_C00229\_c"/>  
 </listOfProducts>  
 </reaction>

```

    <speciesReference species="M_cpd11562_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05426" name="3-oxoacyl-[acyl-carrier protein] reductase (EC
1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein]
reductase(BSU29420)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>
      <p>GENE_LIST: BSU15910 BSU16870 BSU29420</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11562_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11563_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05427" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase

```

(EC 4.2.1.-)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU36370</p>

<p>GENE\_LIST: BSU36370</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_cpd11563\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_cpd11564\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05428" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC 1.3.1.10)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU08650</p>

<p>GENE\_LIST: BSU08650</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00005\_c"/>

<speciesReference species="M\_cpd11564\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00006\_c"/>

<speciesReference species="M\_cpd11565\_c"/>

</listOfProducts>



```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05429" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC
2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC
2.3.1.41)(BSU11340)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and
BSU11340 ) )</p>
      <p>GENE_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01209_c"/>
    <speciesReference species="M_cpd11565_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_cpd11566_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

<reaction id="R\_rxn05430" name="3-oxoacyl-[acyl-carrier protein] reductase (EC 1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein] reductase(BSU29420)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>

<p>GENE\_LIST: BSU15910 BSU16870 BSU29420</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00005\_c"/>

<speciesReference species="M\_cpd11566\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00006\_c"/>

<speciesReference species="M\_cpd11567\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05431" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase (EC 4.2.1.-)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU36370</p>

<p>GENE\_LIST: BSU36370</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_cpd11567\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00001\_c"/>

```

    <speciesReference species="M_cpd11568_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05432" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC
1.3.1.10)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08650</p>
      <p>GENE_LIST: BSU08650</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00005_c"/>
    <speciesReference species="M_cpd11568_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11569_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05433" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC
1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)"

```

```

reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU11720 or BSU26800 )</p>
      <p>GENE_LIST: BSU11720 BSU26800</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_cpd11498_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_cpd11499_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05434" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC
1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU11720 or BSU26800 )</p>
      <p>GENE_LIST: BSU11720 BSU26800</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_cpd11502_c"/>
  </listOfReactants>
  <listOfProducts>

```

```

    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_cpd11503_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05435" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC
1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU11720 or BSU26800 )</p>
      <p>GENE_LIST: BSU11720 BSU26800</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_cpd11506_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_cpd11507_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

<reaction id="R\_rxn05436" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC 1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU11720 or BSU26800 )</p>

<p>GENE\_LIST: BSU11720 BSU26800</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00004\_c"/>

<speciesReference species="M\_cpd11510\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00003\_c"/>

<speciesReference species="M\_cpd11511\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05437" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC 1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU11720 or BSU26800 )</p>

<p>GENE\_LIST: BSU11720 BSU26800</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00004\_c"/>

<speciesReference species="M\_cpd11514\_c"/>

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_cpd11515_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05438" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC
1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU11720 or BSU26800 )</p>
      <p>GENE_LIST: BSU11720 BSU26800</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_cpd11518_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_cpd11519_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </kineticLaw>
  </reaction>
  <reaction id="R_rxn05439" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC
1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)"
reversible="false">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: ( BSU11720 or BSU26800 )</p>
        <p>GENE_LIST: BSU11720 BSU26800</p>
        <p>SUBSYSTEM: Fatty Acids and Lipids</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00080_c"/>
      <speciesReference species="M_C00004_c"/>
      <speciesReference species="M_cpd11523_c"/>
    </listOfReactants>
    <listOfProducts>
      <speciesReference species="M_C00003_c"/>
      <speciesReference species="M_cpd11524_c"/>
    </listOfProducts>
    <kineticLaw>
      <math xmlns="http://www.w3.org/1998/Math/MathML">
        <ci> FLUX_VALUE </ci>
      </math>
      <listOfParameters>
        <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
        <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
      </listOfParameters>
    </kineticLaw>
  </reaction>
  <reaction id="R_rxn05440" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC
1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)"
reversible="false">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: ( BSU11720 or BSU26800 )</p>
        <p>GENE_LIST: BSU11720 BSU26800</p>
        <p>SUBSYSTEM: Fatty Acids and Lipids</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00080_c"/>

```



```

    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_cpd11527_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_cpd11528_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05441" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC
1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU11720 or BSU26800 )</p>
      <p>GENE_LIST: BSU11720 BSU26800</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_cpd11531_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_cpd11532_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```

```

        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05442" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC
1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)"
reversible="false">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: ( BSU11720 or BSU26800 )</p>
            <p>GENE_LIST: BSU11720 BSU26800</p>
            <p>SUBSYSTEM: Fatty Acids and Lipids</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00080_c"/>
        <speciesReference species="M_C00004_c"/>
        <speciesReference species="M_cpd11535_c"/>
    </listOfReactants>
    <listOfProducts>
        <speciesReference species="M_C00003_c"/>
        <speciesReference species="M_cpd11536_c"/>
    </listOfProducts>
    <kineticLaw>
        <math xmlns="http://www.w3.org/1998/Math/MathML">
            <ci> FLUX_VALUE </ci>
        </math>
        <listOfParameters>
            <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
            <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
            <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
        </listOfParameters>
    </kineticLaw>
</reaction>
<reaction id="R_rxn05443" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC
1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)"
reversible="false">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: ( BSU11720 or BSU26800 )</p>
            <p>GENE_LIST: BSU11720 BSU26800</p>
            <p>SUBSYSTEM: Fatty Acids and Lipids</p>
        </html>
    </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_cpd11539_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_cpd11540_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05444" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC
1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU11720 or BSU26800 )</p>
      <p>GENE_LIST: BSU11720 BSU26800</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_cpd11543_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_cpd11544_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05445" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC
1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU11720 or BSU26800 )</p>
      <p>GENE_LIST: BSU11720 BSU26800</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_cpd11548_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_cpd11549_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05446" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC
1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU11720 or BSU26800 )</p>
      <p>GENE_LIST: BSU11720 BSU26800</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>

```

```

</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_cpd11552_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_cpd11553_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05447" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC
1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU11720 or BSU26800 )</p>
      <p>GENE_LIST: BSU11720 BSU26800</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_cpd11556_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_cpd11557_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05448" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC
1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU11720 or BSU26800 )</p>
      <p>GENE_LIST: BSU11720 BSU26800</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_cpd11560_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_cpd11561_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05449" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC
1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU11720 or BSU26800 )</p>

```

<p>GENE\_LIST: BSU11720 BSU26800</p>  
 <p>SUBSYSTEM: Fatty Acids and Lipids</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00004\_c"/>  
 <speciesReference species="M\_cpd11564\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00003\_c"/>  
 <speciesReference species="M\_cpd11565\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_rxn05450" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC 1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)" reversible="false">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: ( BSU11720 or BSU26800 )</p>  
 <p>GENE\_LIST: BSU11720 BSU26800</p>  
 <p>SUBSYSTEM: Fatty Acids and Lipids</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C00004\_c"/>  
 <speciesReference species="M\_cpd11568\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00003\_c"/>  
 <speciesReference species="M\_cpd11569\_c"/>  
 </listOfProducts>  
 <kineticLaw>

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05451" name="Malonyl CoA-acyl carrier protein transacylase (EC
2.3.1.39)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15900</p>
      <p>GENE_LIST: BSU15900</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd11515_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_cpd11439_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05452" name="Malonyl CoA-acyl carrier protein transacylase (EC
2.3.1.39)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15900</p>
      <p>GENE_LIST: BSU15900</p>

```



```

    <p>SUBSYSTEM: Fatty Acids and Lipids</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00010_c"/>
  <speciesReference species="M_cpd11519_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_cpd11434_c"/>
  <speciesReference species="M_C00229_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05453" name="Malonyl CoA-acyl carrier protein transacylase (EC
2.3.1.39)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15900</p>
      <p>GENE_LIST: BSU15900</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd11540_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_cpd11437_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05454" name="Malonyl CoA-acyl carrier protein transacylase (EC
2.3.1.39)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15900</p>
      <p>GENE_LIST: BSU15900</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd11544_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_cpd11432_c"/>
    <speciesReference species="M_C00229_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05455" name="Malonyl CoA-acyl carrier protein transacylase (EC
2.3.1.39)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15900</p>
      <p>GENE_LIST: BSU15900</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd11565_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_cpd11435_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05456" name="Malonyl CoA-acyl carrier protein transacylase (EC
2.3.1.39)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15900</p>
      <p>GENE_LIST: BSU15900</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd11569_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_cpd11441_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>

```

```

    </kineticLaw>
  </reaction>
  <reaction id="R_rxn05457" name="Malonyl CoA-acyl carrier protein transacylase (EC
2.3.1.39)">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU15900</p>
        <p>GENE_LIST: BSU15900</p>
        <p>SUBSYSTEM: Fatty Acids and Lipids</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00010_c"/>
      <speciesReference species="M_C05761_c"/>
    </listOfReactants>
    <listOfProducts>
      <speciesReference species="M_C00229_c"/>
      <speciesReference species="M_C02593_c"/>
    </listOfProducts>
    <kineticLaw>
      <math xmlns="http://www.w3.org/1998/Math/MathML">
        <ci> FLUX_VALUE </ci>
      </math>
      <listOfParameters>
        <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
      </listOfParameters>
    </kineticLaw>
  </reaction>
  <reaction id="R_rxn05458" name="Malonyl CoA-acyl carrier protein transacylase (EC
2.3.1.39)">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU15900</p>
        <p>GENE_LIST: BSU15900</p>
        <p>SUBSYSTEM: Fatty Acids and Lipids</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00010_c"/>
      <speciesReference species="M_C05764_c"/>
    </listOfReactants>
    <listOfProducts>

```

```

    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_C00154_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05459" name="Malonyl CoA-acyl carrier protein transacylase (EC
2.3.1.39)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15900</p>
      <p>GENE_LIST: BSU15900</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd11573_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_C00412_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05460" name="3-oxoacyl-[acyl-carrier-protein] synthase III (EC
2.3.1.41);3-oxoacyl-[acyl-carrier-protein] synthase, KASIII (EC

```

2.3.1.41)(BSU11330);3-oxoacyl-[acyl-carrier-protein] synthase, KASII (EC 2.3.1.41)(BSU11340)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( ( BSU11330 and BSU11340 ) or ( BSU10170 and BSU11340 ) )</p>

<p>GENE\_LIST: BSU11330 BSU11340 BSU10170 BSU11340</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C05764\_c"/>

<speciesReference species="M\_C01209\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00011\_c"/>

<speciesReference species="M\_C00229\_c"/>

<speciesReference species="M\_cpd11570\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05461" name="3-oxoacyl-[acyl-carrier protein] reductase (EC 1.1.1.100);3-oxoacyl-[acyl-carrier protein] reductase(BSU16870);3-oxoacyl-[acyl-carrier protein] reductase(BSU29420)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU15910 or BSU16870 or BSU29420 )</p>

<p>GENE\_LIST: BSU15910 BSU16870 BSU29420</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00005\_c"/>

```

    <speciesReference species="M_cpd11570_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_cpd11571_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05462" name="(3R)-hydroxymyristoyl-[acyl carrier protein] dehydratase
(EC 4.2.1.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36370</p>
      <p>GENE_LIST: BSU36370</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11571_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11572_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

<reaction id="R\_rxn05463" name="Enoyl-[acyl-carrier-protein] reductase [NADPH] (EC 1.3.1.10)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU08650</p>

<p>GENE\_LIST: BSU08650</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00005\_c"/>

<speciesReference species="M\_cpd11572\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00006\_c"/>

<speciesReference species="M\_cpd11573\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05464" name="Enoyl-[acyl-carrier-protein] reductase [NADH] (EC 1.3.1.9);Enoyl-[acyl-carrier-protein] reductase [FMN] (EC 1.3.1.9) homolog(BSU26800)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU11720 or BSU26800 )</p>

<p>GENE\_LIST: BSU11720 BSU26800</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00004\_c"/>

<speciesReference species="M\_cpd11572\_c"/>

</listOfReactants>



```

<listOfProducts>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_cpd11573_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05466" name="Ammonium transporter">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36510</p>
      <p>GENE_LIST: BSU36510</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00014_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00014_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05467" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>

```

```

    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00011_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00011_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05468" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00007_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00007_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

</kineticLaw>
</reaction>
<reaction id="R_rxn05469" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00022_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00022_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05470" name="L-lactate permease">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU34190 or BSU03060 )</p>
      <p>GENE_LIST: BSU34190 BSU03060</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00160_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00160_c"/>
  </listOfProducts>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05471" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00144_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00144_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05472" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C02323_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C02323_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05473" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00988_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00988_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05474" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00631_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00631_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05475" name="gamma-aminobutyrate (GABA) permease">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU06310</p>
      <p>GENE_LIST: BSU06310</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_cpd11599_e"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_cpd11599_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05476" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C01367_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01367_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05477" name="">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: </p>
  <p>GENE_LIST: </p>
  <p>SUBSYSTEM: Membrane Transport</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C05822_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C05822_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05478" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C06193_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C06193_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </kineticLaw>
</reaction>

```



```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05479" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00197_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00197_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05480" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C01368_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01368_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05481" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C03089_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C03089_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_rxn05482" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00345_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00345_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05483" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00532_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00532_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05484" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00164_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00164_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05485" name="PTS system, N-acetylglucosamine-specific IIB component
(EC 2.7.1.69)|PTS system, N-acetylglucosamine-specific IIC component (EC
2.7.1.69);Phosphoenolpyruvate-protein phosphotransferase of PTS system (EC
2.7.3.9)(BSU13910);Phosphocarrier protein of PTS system(BSU13900)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU13900 and BSU13910 and BSU07700 )</p>
      <p>GENE_LIST: BSU13900 BSU13910 BSU07700</p>
    </html>
  </notes>

```

```

    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00140_e"/>
  <speciesReference species="M_C00074_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00022_c"/>
  <speciesReference species="M_C00357_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05486" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00645_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00645_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05487" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00270_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00270_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05488" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00033_e"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00033_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05491" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00147_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00147_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05493" name="2-oxoglutarate/malate translocator;Putative transporter
yoaB(BSU18540);alpha-ketoglutarate permease(BSU27760)">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: ( BSU18540 or BSU07570 or BSU27760 )</p>
    <p>GENE_LIST: BSU18540 BSU07570 BSU27760</p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C00026_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00026_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05494" name="D-serine/D-alanine/glycine transporter;Na(+)-linked
D-alanine glycine permease(BSU07750)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU05620 or BSU07750 or BSU27090 )</p>
      <p>GENE_LIST: BSU05620 BSU07750 BSU27090</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00133_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00133_c"/>
  </listOfProducts>
  <kineticLaw>

```



```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05495" name="D-serine/D-alanine/glycine transporter">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU05620</p>
      <p>GENE_LIST: BSU05620</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00099_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00099_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05497" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C00020_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00020_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05498" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11598_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_cpd11598_e"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_rxn05499" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00216_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00216_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05500" name="Arabinose-proton symporter">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU33960</p>
      <p>GENE_LIST: BSU33960</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00259_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00259_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05501" name="Phosphoenolpyruvate-protein phosphotransferase of PTS
system (EC 2.7.3.9);PTS system, beta-glucoside-specific IIA component (EC 2.7.1.69)|PTS
system, beta-glucoside-specific IIB component (EC 2.7.1.69)|PTS system, beta-glucoside-specific
IIC component (EC 2.7.1.69)(BSU39270);Phosphocarrier protein of PTS system(BSU13900)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU13900 and BSU13910 and BSU39270 )</p>
      <p>GENE_LIST: BSU13900 BSU13910 BSU39270</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00074_c"/>
    <speciesReference species="M_C06186_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00022_c"/>
    <speciesReference species="M_C06187_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05502" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>

```

```

    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C05945_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C05945_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05504" name="Glycine betaine ABC transport system, ATP-binding
protein OpuAA (EC 3.6.3.32);Glycine betaine ABC transport system, permease protein
OpuAB(BSU02990);Glycine betaine ABC transport system, glycine betaine-binding protein
OpuAC(BSU03000)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU02980 and BSU02990 and BSU03000 )</p>
      <p>GENE_LIST: BSU02980 BSU02990 BSU03000</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11597_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd11597_c"/>
  </listOfProducts>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05505" name="Glycine betaine transporter OpuD">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30070</p>
      <p>GENE_LIST: BSU30070</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_cpd11597_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd11597_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05506" name="Arsenic efflux pump protein;Arsenical-resistance protein
ACR3(BSU25790);Arsenical pump membrane protein(BSU36030)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU25790 or BSU36030 or BSU05340 )</p>

```

<p>GENE\_LIST: BSU25790 BSU36030 BSU05340</p>  
 <p>SUBSYSTEM: Membrane Transport</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_cpd01048\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_cpd01048\_e"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_rxn05507" name="Arsenic efflux pump protein;Arsenical-resistance protein  
 ACR3(BSU25790);Arsenical pump membrane protein(BSU36030)">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: ( BSU25790 or BSU36030 or BSU05340 )</p>  
 <p>GENE\_LIST: BSU25790 BSU36030 BSU05340</p>  
 <p>SUBSYSTEM: Membrane Transport</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C06697\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C06697\_e"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05508" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00152_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00152_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05511" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C03044_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>

```



```

    <speciesReference species="M_C03044_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05512" name="Alkanesulfonates ABC transporter ATP-binding
protein;Alkanesulfonates-binding protein(BSU08840);Alkanesulfonates transport system
permease protein(BSU08850)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU08830 and BSU08840 and BSU08850 )</p>
      <p>GENE_LIST: BSU08830 BSU08840 BSU08850</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11596_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd11596_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_rxn05513" name="cation-transporting ATPase, E1-E2 family"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15650</p>
      <p>GENE_LIST: BSU15650</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00076_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00076_e"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05514" name="calcium/proton exchanger">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU07920</p>
      <p>GENE_LIST: BSU07920</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00076_c"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00076_e"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05515" name="Adenosylcobinamide amidohydrolase (EC
3.5.1.90)|Vitamin B12 ABC transporter, ATPase component BtuD;Vitamin B12 ABC transporter,
permease component BtuC(BSU33170);Vitamin B12 ABC transporter, B12-binding component
BtuF(BSU33180)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU33160 and BSU33170 and BSU33180 )</p>
      <p>GENE_LIST: BSU33160 BSU33170 BSU33180</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00541_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00541_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05516" name="Copper-translocating P-type ATPase (EC 3.6.3.4)|Lead,
cadmium, zinc and mercury transporting ATPase (EC 3.6.3.3) (EC 3.6.3.5)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU13850 or BSU33490 )</p>
      <p>GENE_LIST: BSU13850 BSU33490</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01413_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01413_e"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05517" name="Cobalt-zinc-cadmium resistance protein CzcD">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU26650</p>
      <p>GENE_LIST: BSU26650</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00238_e"/>
    <speciesReference species="M_C01413_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00238_c"/>
    <speciesReference species="M_C01413_e"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05518" name="PTS system, cellobiose-specific IIB component (EC
2.7.1.69);PTS system, cellobiose-specific IIB component (EC 2.7.1.69)|PTS system, lichenan-,
cellobiose-specific IIB component (EC 2.7.1.69)(BSU38590);PTS system, cellobiose-specific IIA
component (EC 2.7.1.69)(BSU05820);PTS system, cellobiose-specific IIA component (EC
2.7.1.69)(BSU38570);PTS system, cellobiose-specific IIC component (EC
2.7.1.69)(BSU05830);PTS system, cellobiose-specific IIC component (EC
2.7.1.69)(BSU38390);PTS system, cellobiose-specific IIC component (EC 2.7.1.69)(BSU38580)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU38390 and BSU38570 and BSU38590 ) or
( BSU38570 and BSU38580 and BSU38590 ) or ( BSU05810 and BSU05820 and
BSU05830 ) )</p>
      <p>GENE_LIST: BSU38390 BSU38570 BSU38590 BSU38570 BSU38580 BSU38590
BSU05810 BSU05820 BSU05830</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00074_c"/>
    <speciesReference species="M_C00185_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00022_c"/>

```

```

    <speciesReference species="M_C04534_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05519" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00251_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00251_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05525" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>

```

```

    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C00055_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00055_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05526" name="Chromate transport protein" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU36120 or BSU36130 )</p>
      <p>GENE_LIST: BSU36120 BSU36130</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd11595_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_cpd11595_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05527" name="Cytosine/purine/uracil/thiamine/allantoin permease family
protein;Purine-cytosine permease(BSU38710)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU38710 or BSU36470 )</p>
      <p>GENE_LIST: BSU38710 BSU36470</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00380_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00380_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05528" name="Copper-translocating P-type ATPase (EC 3.6.3.4);Copper
resistance protein D(BSU03950)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU03950 or BSU33500 )</p>
      <p>GENE_LIST: BSU03950 BSU33500</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>

```



```

    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00070_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00070_e"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05529" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C01419_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01419_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```

```

        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05531" name="">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: </p>
            <p>GENE_LIST: </p>
            <p>SUBSYSTEM: Membrane Transport</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00080_e"/>
        <speciesReference species="M_C00721_e"/>
    </listOfReactants>
    <listOfProducts>
        <speciesReference species="M_C00080_c"/>
        <speciesReference species="M_C00721_c"/>
    </listOfProducts>
    <kineticLaw>
        <math xmlns="http://www.w3.org/1998/Math/MathML">
            <ci> FLUX_VALUE </ci>
        </math>
        <listOfParameters>
            <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
            <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
            <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
        </listOfParameters>
    </kineticLaw>
</reaction>
<reaction id="R_rxn05532" name="">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: </p>
            <p>GENE_LIST: </p>
            <p>SUBSYSTEM: Membrane Transport</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00184_e"/>
    </listOfReactants>
    <listOfProducts>
        <speciesReference species="M_C00184_c"/>
    </listOfProducts>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05533" name="Dipeptide transport system permease protein dppB (TC
3.A.1.5.2);Dipeptide transport system permease protein dppC (TC
3.A.1.5.2)(BSU12940);Dipeptide transport ATP-binding protein dppD (TC
3.A.1.5.2)(BSU12950);Dipeptide-binding ABC transporter, periplasmic substrate-binding
component (TC 3.A.1.5.2)(BSU12960)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU12930 and BSU12940 and BSU12950 and
BSU12960 )</p>
      <p>GENE_LIST: BSU12930 BSU12940 BSU12950 BSU12960</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11593_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd11593_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>

<reaction id="R_rxn05534" name="Dipeptide transport system permease protein dppB (TC
3.A.1.5.2);Dipeptide transport system permease protein dppC (TC
3.A.1.5.2)(BSU12940);Dipeptide transport ATP-binding protein dppD (TC
3.A.1.5.2)(BSU12950);Dipeptide-binding ABC transporter, periplasmic substrate-binding
component (TC 3.A.1.5.2)(BSU12960)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU12930 and BSU12940 and BSU12950 and
BSU12960 )</p>
      <p>GENE_LIST: BSU12930 BSU12940 BSU12950 BSU12960</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11592_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd11592_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

<reaction id="R_rxn05535" name="Dipeptide transport system permease protein dppB (TC
3.A.1.5.2);Dipeptide transport system permease protein dppC (TC
3.A.1.5.2)(BSU12940);Dipeptide transport ATP-binding protein dppD (TC
3.A.1.5.2)(BSU12950);Dipeptide-binding ABC transporter, periplasmic substrate-binding
component (TC 3.A.1.5.2)(BSU12960)" reversible="false">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: ( BSU12930 and BSU12940 and BSU12950 and
BSU12960 )</p>
  <p>GENE_LIST: BSU12930 BSU12940 BSU12950 BSU12960</p>
  <p>SUBSYSTEM: Membrane Transport</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_cpd11591_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_cpd11591_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
  <reaction id="R_rxn05536" name="Dipeptide transport system permease protein dppB (TC
3.A.1.5.2);Dipeptide transport system permease protein dppC (TC
3.A.1.5.2)(BSU12940);Dipeptide transport ATP-binding protein dppD (TC
3.A.1.5.2)(BSU12950);Dipeptide-binding ABC transporter, periplasmic substrate-binding
component (TC 3.A.1.5.2)(BSU12960)" reversible="false">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: ( BSU12930 and BSU12940 and BSU12950 and
BSU12960 )</p>
        <p>GENE_LIST: BSU12930 BSU12940 BSU12950 BSU12960</p>
        <p>SUBSYSTEM: Membrane Transport</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00002_c"/>

```

```

    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11590_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd11590_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05537" name="Dipeptide transport system permease protein dppB (TC
3.A.1.5.2);Dipeptide transport system permease protein dppC (TC
3.A.1.5.2)(BSU12940);Dipeptide transport ATP-binding protein dppD (TC
3.A.1.5.2)(BSU12950);Dipeptide-binding ABC transporter, periplasmic substrate-binding
component (TC 3.A.1.5.2)(BSU12960)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU12930 and BSU12940 and BSU12950 and
BSU12960 )</p>
      <p>GENE_LIST: BSU12930 BSU12940 BSU12950 BSU12960</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11589_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd11589_c"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05538" name="Dipeptide transport system permease protein dppB (TC
3.A.1.5.2);Dipeptide transport system permease protein dppC (TC
3.A.1.5.2)(BSU12940);Dipeptide transport ATP-binding protein dppD (TC
3.A.1.5.2)(BSU12950);Dipeptide-binding ABC transporter, periplasmic substrate-binding
component (TC 3.A.1.5.2)(BSU12960)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU12930 and BSU12940 and BSU12950 and
BSU12960 )</p>
      <p>GENE_LIST: BSU12930 BSU12940 BSU12950 BSU12960</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11588_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd11588_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

</kineticLaw>
</reaction>
<reaction id="R_rxn05539" name="Dipeptide transport system permease protein dppB (TC
3.A.1.5.2);Dipeptide transport system permease protein dppC (TC
3.A.1.5.2)(BSU12940);Dipeptide transport ATP-binding protein dppD (TC
3.A.1.5.2)(BSU12950);Dipeptide-binding ABC transporter, periplasmic substrate-binding
component (TC 3.A.1.5.2)(BSU12960)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU12930 and BSU12940 and BSU12950 and
BSU12960 )</p>
      <p>GENE_LIST: BSU12930 BSU12940 BSU12950 BSU12960</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01419_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01419_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05540" name="Dipeptide transport system permease protein dppB (TC
3.A.1.5.2);Dipeptide transport system permease protein dppC (TC
3.A.1.5.2)(BSU12940);Dipeptide transport ATP-binding protein dppD (TC
3.A.1.5.2)(BSU12950);Dipeptide-binding ABC transporter, periplasmic substrate-binding
component (TC 3.A.1.5.2)(BSU12960)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```



<p>GENE\_ASSOCIATION: ( BSU12930 and BSU12940 and BSU12950 and BSU12960 )</p>

<p>GENE\_LIST: BSU12930 BSU12940 BSU12950 BSU12960</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00002\_c"/>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_cpd11587\_e"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00008\_c"/>

<speciesReference species="M\_C00009\_c"/>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_cpd11587\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05541" name="Dipeptide transport system permease protein dppB (TC 3.A.1.5.2);Dipeptide transport system permease protein dppC (TC 3.A.1.5.2)(BSU12940);Dipeptide transport ATP-binding protein dppD (TC 3.A.1.5.2)(BSU12950);Dipeptide-binding ABC transporter, periplasmic substrate-binding component (TC 3.A.1.5.2)(BSU12960)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU12930 and BSU12940 and BSU12950 and BSU12960 )</p>

<p>GENE\_LIST: BSU12930 BSU12940 BSU12950 BSU12960</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00002\_c"/>

<speciesReference species="M\_C00001\_c"/>

```

    <speciesReference species="M_cpd11586_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd11586_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05542" name="Dipeptide transport system permease protein dppB (TC
3.A.1.5.2);Dipeptide transport system permease protein dppC (TC
3.A.1.5.2)(BSU12940);Dipeptide transport ATP-binding protein dppD (TC
3.A.1.5.2)(BSU12950);Dipeptide-binding ABC transporter, periplasmic substrate-binding
component (TC 3.A.1.5.2)(BSU12960)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU12930 and BSU12940 and BSU12950 and
BSU12960 )</p>
      <p>GENE_LIST: BSU12930 BSU12940 BSU12950 BSU12960</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11585_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd11585_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05543" name="Dipeptide transport system permease protein dppB (TC
3.A.1.5.2);Dipeptide transport system permease protein dppC (TC
3.A.1.5.2)(BSU12940);Dipeptide transport ATP-binding protein dppD (TC
3.A.1.5.2)(BSU12950);Dipeptide-binding ABC transporter, periplasmic substrate-binding
component (TC 3.A.1.5.2)(BSU12960)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU12930 and BSU12940 and BSU12950 and
BSU12960 )</p>
      <p>GENE_LIST: BSU12930 BSU12940 BSU12950 BSU12960</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11584_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd11584_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_rxn05544" name="Dipeptide transport system permease protein dppB (TC
3.A.1.5.2);Dipeptide transport system permease protein dppC (TC
3.A.1.5.2)(BSU12940);Dipeptide transport ATP-binding protein dppD (TC
3.A.1.5.2)(BSU12950);Dipeptide-binding ABC transporter, periplasmic substrate-binding
component (TC 3.A.1.5.2)(BSU12960)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU12930 and BSU12940 and BSU12950 and
BSU12960 )</p>
      <p>GENE_LIST: BSU12930 BSU12940 BSU12950 BSU12960</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11583_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd11583_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05545" name="Dipeptide transport system permease protein dppB (TC
3.A.1.5.2);Dipeptide transport system permease protein dppC (TC
3.A.1.5.2)(BSU12940);Dipeptide transport ATP-binding protein dppD (TC
3.A.1.5.2)(BSU12950);Dipeptide-binding ABC transporter, periplasmic substrate-binding
component (TC 3.A.1.5.2)(BSU12960)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU12930 and BSU12940 and BSU12950 and

```

```

BSU12960 )</p>
  <p>GENE_LIST: BSU12930 BSU12940 BSU12950 BSU12960</p>
  <p>SUBSYSTEM: Membrane Transport</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_cpd11582_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_cpd11582_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
  <reaction id="R_rxn05546" name="Dipeptide transport system permease protein dppB (TC
3.A.1.5.2);Dipeptide transport system permease protein dppC (TC
3.A.1.5.2)(BSU12940);Dipeptide transport ATP-binding protein dppD (TC
3.A.1.5.2)(BSU12950);Dipeptide-binding ABC transporter, periplasmic substrate-binding
component (TC 3.A.1.5.2)(BSU12960)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU12930 and BSU12940 and BSU12950 and
BSU12960 )</p>
      <p>GENE_LIST: BSU12930 BSU12940 BSU12950 BSU12960</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11581_e"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_cpd11581_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05547" name="Dipeptide transport system permease protein dppB (TC
3.A.1.5.2);Dipeptide transport system permease protein dppC (TC
3.A.1.5.2)(BSU12940);Dipeptide transport ATP-binding protein dppD (TC
3.A.1.5.2)(BSU12950);Dipeptide-binding ABC transporter, periplasmic substrate-binding
component (TC 3.A.1.5.2)(BSU12960)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU12930 and BSU12940 and BSU12950 and
BSU12960 )</p>
      <p>GENE_LIST: BSU12930 BSU12940 BSU12950 BSU12960</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11580_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd11580_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05548" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C08275_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C08275_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05549" name="Ribose ABC transport system, ATP-binding protein RbsA
(TC 3.A.1.2.1);Ribose ABC transport system, high affinity permease RbsD (TC
3.A.1.2.1)(BSU35930);Ribose ABC transport system, permease protein RbsC (TC
3.A.1.2.1)(BSU35950);Ribose ABC transport system, periplasmic ribose-binding protein RbsB
(TC 3.A.1.2.1)(BSU35960)" reversible="false">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: ( BSU35930 and BSU35940 and BSU35950 and
BSU35960 )</p>
    <p>GENE_LIST: BSU35930 BSU35940 BSU35950 BSU35960</p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C01801_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C01801_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05550" name="Osmotically activated L-carnitine/choline ABC transporter,
permease protein OpuCD;Osmotically activated L-carnitine/choline ABC transporter,
substrate-binding protein OpuCC(BSU33810);Osmotically activated L-carnitine/choline ABC
transporter, permease protein OpuCB(BSU33820);Osmotically activated L-carnitine/choline ABC
transporter, ATP-binding protein OpuCA(BSU33830)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU33800 and BSU33810 and BSU33820 and
BSU33830 )</p>
      <p>GENE_LIST: BSU33800 BSU33810 BSU33820 BSU33830</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>

```



```

    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C06231_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C06231_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05551" name="Ethanolamine permease" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU39450</p>
      <p>GENE_LIST: BSU39450</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00189_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00189_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05552" name="Alkanesulfonates ABC transporter ATP-binding
protein;Alkanesulfonates-binding protein(BSU08840);Alkanesulfonates transport system
permease protein(BSU08850)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU08830 and BSU08840 and BSU08850 )</p>
      <p>GENE_LIST: BSU08830 BSU08840 BSU08850</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11579_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd11579_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05553" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C00469_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00469_e"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05554" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00009_c" stoichiometry="2"/>
    <speciesReference species="M_C05345_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_e" stoichiometry="2"/>
    <speciesReference species="M_C05345_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

</kineticLaw>
</reaction>
<reaction id="R_rxn05555" name="Iron compound ABC uptake transporter ATP-binding
protein;component of iron-uptake system(BSU01610);component of iron-uptake
system(BSU01620);component of iron-uptake system(BSU01630);Iron compound ABC uptake
transporter permease protein(BSU03800);Iron compound ABC uptake transporter permease
protein(BSU03810);Iron compound ABC uptake transporter substrate-binding
protein(BSU03830)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU01610 and BSU01620 and BSU01630 ) or
( BSU03800 and BSU03810 and BSU03820 and BSU03830 ) )</p>
      <p>GENE_LIST: BSU01610 BSU01620 BSU01630 BSU03800 BSU03810 BSU03820
BSU03830</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C14818_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C14818_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05557" name="Iron(III) dicitrate transport ATP-binding protein FecE (TC
3.A.1.14.1);Iron(III) dicitrate transport system, periplasmic iron-binding protein FecB (TC
3.A.1.14.1)(BSU08440);Iron(III) dicitrate transport system permease protein fecD (TC
3.A.1.14.1)(BSU08450);Iron(III) dicitrate transport system permease protein fecD (TC
3.A.1.14.1)(BSU08460)" reversible="false">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: ( ( BSU08440 and BSU08450 and BSU08460 ) or
BSU32940 )</p>
    <p>GENE_LIST: BSU08440 BSU08450 BSU08460 BSU32940</p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00158_e" stoichiometry="2"/>
  <speciesReference species="M_C14819_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00158_c" stoichiometry="2"/>
  <speciesReference species="M_C14819_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05558" name="Ferrichrome transport ATP-binding protein FhuC (TC
3.A.1.14.3);Ferrichrome transport system permease protein fhuG(BSU33300);Ferrichrome
transport system permease protein fhuB (TC 3.A.1.14.3)(BSU33310);Ferrichrome-binding
periplasmic protein precursor (TC 3.A.1.14.3)(BSU33320)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU33290 and BSU33300 and BSU33310 and
BSU33320 )</p>
      <p>GENE_LIST: BSU33290 BSU33300 BSU33310 BSU33320</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C07597_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C07597_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05559" name="Formate efflux transporter (TC 2.A.44
family);Formate/nitrite family of transporters(BSU38060)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU27200 or BSU38060 )</p>
      <p>GENE_LIST: BSU27200 BSU38060</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00058_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00058_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05560" name="PTS system, fructose-specific IIB component (EC
2.7.1.69);PTS system, fructose-specific IIA component (EC 2.7.1.69)|PTS system,
fructose-specific IIB component (EC 2.7.1.69)|PTS system, fructose-specific IIC component (EC
2.7.1.69)(BSU14400);PTS system, fructose-specific IIA component (EC
2.7.1.69)(BSU27070);Phosphocarrier protein of PTS system(BSU13900);PTS system,
fructose-specific IID component (EC 2.7.1.69)(BSU27040);PTS system, fructose-specific IIC
component (EC 2.7.1.69)(BSU27050)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU13900 and BSU14400 and BSU27040 ) or
( BSU13900 and BSU27040 and BSU27050 and BSU27060 and BSU27070 ) )</p>
      <p>GENE_LIST: BSU13900 BSU14400 BSU27040 BSU13900 BSU27040 BSU27050
BSU27060 BSU27070</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00074_c"/>
    <speciesReference species="M_C00095_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00022_c"/>
    <speciesReference species="M_C01094_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05561" name="TRAP-type C4-dicarboxylate transport system,
periplasmic component;C4-dicarboxylate transport protein(BSU04470)">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: ( BSU04440 and BSU04470 )</p>
  <p>GENE_LIST: BSU04440 BSU04470</p>
  <p>SUBSYSTEM: Membrane Transport</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C00122_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00122_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05562" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00009_c" stoichiometry="2"/>
    <speciesReference species="M_C00103_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_e" stoichiometry="2"/>
    <speciesReference species="M_C00103_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```



```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05563" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00009_c" stoichiometry="2"/>
    <speciesReference species="M_C00668_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_e" stoichiometry="2"/>
    <speciesReference species="M_C00668_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05564" name="gamma-aminobutyrate (GABA) permease">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU06310</p>
      <p>GENE_LIST: BSU06310</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00334_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00334_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05565" name="D-glucarate permease">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02480</p>
      <p>GENE_LIST: BSU02480</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00879_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00879_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_rxn05566" name="Arabinose-proton symporter">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU33960</p>
      <p>GENE_LIST: BSU33960</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00124_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00124_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05567" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00074_c"/>
    <speciesReference species="M_C01697_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00022_c"/>
    <speciesReference species="M_C06311_c"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05568" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00352_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00352_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05569" name="Phosphoenolpyruvate-protein phosphotransferase of PTS
system (EC 2.7.3.9);PTS system, Glucosamine-specific IIA component (EC 2.7.1.69)|PTS system,
Glucosamine-specific IIB component (EC 2.7.1.69)|PTS system, Glucosamine-specific IIC
component (EC 2.7.1.69)(BSU02350);Phosphocarrier protein of PTS system(BSU13900)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU13900 and BSU13910 and BSU02350 )</p>

```

<p>GENE\_LIST: BSU13900 BSU13910 BSU02350</p>  
 <p>SUBSYSTEM: Membrane Transport</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00074\_c"/>  
 <speciesReference species="M\_C00329\_e"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00022\_c"/>  
 <speciesReference species="M\_C00352\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_rxn05570" name="Glycine betaine ABC transport system, ATP-binding protein OpuAA (EC 3.6.3.32);Glycine betaine ABC transport system, permease protein OpuAB(BSU02990);Glycine betaine ABC transport system, glycine betaine-binding protein OpuAC(BSU03000)" reversible="false">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: ( BSU02980 and BSU02990 and BSU03000 )</p>  
 <p>GENE\_LIST: BSU02980 BSU02990 BSU03000</p>  
 <p>SUBSYSTEM: Membrane Transport</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00002\_c"/>  
 <speciesReference species="M\_C00001\_c"/>  
 <speciesReference species="M\_C01181\_e"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00008\_c"/>  
 <speciesReference species="M\_C00009\_c"/>  
 <speciesReference species="M\_C00080\_c"/>  
 <speciesReference species="M\_C01181\_c"/>  
 </listOfProducts>

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05571" name="Gluconate permease, Bsu4004 homolog">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU19520 or BSU40070 )</p>
      <p>GENE_LIST: BSU19520 BSU40070</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00257_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00257_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05572" name="D-glucarate permease">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02480</p>
      <p>GENE_LIST: BSU02480</p>
    </html>
  </notes>

```

```

    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C00818_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00818_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05573" name="glucose uptake protein;Glucose/mannose:H+ symporter
GlcP(BSU10520)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU10520 or BSU03920 )</p>
      <p>GENE_LIST: BSU10520 BSU03920</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00267_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00267_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05574" name="Hexuronate transporter">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU12360</p>
      <p>GENE_LIST: BSU12360</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00191_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00191_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05577" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00048_e"/>

```



```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00048_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05578" name="Glycerol-3-phosphate transporter">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02140</p>
      <p>GENE_LIST: BSU02140</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00093_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00093_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05579" name="Glycine betaine transporter OpuD">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: BSU30070</p>
    <p>GENE_LIST: BSU30070</p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C00719_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00719_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05580" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00182_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00182_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05581" name="Glycerol uptake facilitator protein">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU09280</p>
      <p>GENE_LIST: BSU09280</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00116_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00116_e"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05582" name="D-serine/D-alanine/glycine transporter">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU05620 or BSU27090 )</p>
      <p>GENE_LIST: BSU05620 BSU27090</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00037_e"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00037_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05585" name="Alkanesulfonates ABC transporter ATP-binding
protein;Alkanesulfonates-binding protein(BSU08840);Alkanesulfonates transport
system permease protein(BSU08850)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU08830 and BSU08840 and BSU08850 )</p>
      <p>GENE_LIST: BSU08830 BSU08840 BSU08850</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11578_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd11578_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05593" name="Major myo-inositol transporter IolT;Minor myo-inositol
transporter IolF(BSU39710);Minor myo-inositol transporter IolF(BSU39810)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU39710 or BSU06230 or BSU39810 )</p>
      <p>GENE_LIST: BSU39710 BSU06230 BSU39810</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00137_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00137_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05594" name="Alkanesulfonates ABC transporter ATP-binding
protein;Alkanesulfonates-binding protein(BSU08840);Alkanesulfonates transport system
permease protein(BSU08850)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU08830 and BSU08840 and BSU08850 )</p>
      <p>GENE_LIST: BSU08830 BSU08840 BSU08850</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>

```

```

    <speciesReference species="M_C05123_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C05123_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05595" name="potassium uptake;Potassium uptake protein, integral
membrane component, KtrD(BSU13500);Trk system potassium uptake protein
trkA(BSU14510);Potassium uptake protein, integral membrane component,
KtrA(BSU31090);Potassium uptake protein, integral membrane component, KtrB(BSU31100)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU13500 and BSU14510 ) or ( BSU26640 or
BSU31090 and BSU31100 ) )</p>
      <p>GENE_LIST: BSU13500 BSU14510 BSU26640 BSU31090 BSU31100</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00238_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00238_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05597" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11577_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd11577_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05598" name="Predicted rhamnose oligosaccharide ABC transport system, substrate-binding component;Predicted rhamnose oligosaccharide ABC transport system, permease component 2(BSU06980);Predicted rhamnose oligosaccharide ABC transport system, permease component(BSU06990);ABC-type polysaccharide transport system, permease component(BSU07110)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

<p>GENE\_ASSOCIATION: ( ( BSU06970 and BSU06980 and BSU06990 ) or BSU07110 )</p>

<p>GENE\_LIST: BSU06970 BSU06980 BSU06990 BSU07110</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00002\_c"/>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_C00243\_e"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00008\_c"/>

<speciesReference species="M\_C00009\_c"/>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00243\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05599" name="Alkanesulfonates ABC transporter ATP-binding protein;Alkanesulfonates-binding protein(BSU08840);Alkanesulfonates transport system permease protein(BSU08850)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU08830 and BSU08840 and BSU08850 )</p>

<p>GENE\_LIST: BSU08830 BSU08840 BSU08850</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00002\_c"/>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_C00506\_e"/>

</listOfReactants>

<listOfProducts>



```

<speciesReference species="M_C00008_c"/>
<speciesReference species="M_C00009_c"/>
<speciesReference species="M_C00080_c"/>
<speciesReference species="M_C00506_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05601" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00725_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00725_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

</kineticLaw>
</reaction>
<reaction id="R_rxn05602" name="L-lactate permease">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU03060 or BSU34190 )</p>
      <p>GENE_LIST: BSU03060 BSU34190</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00186_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00186_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05603" name="TRAP-type C4-dicarboxylate transport system,
periplasmic component;C4-dicarboxylate transport protein(BSU04470);2-oxoglutarate/malate
translocator(BSU07570);Malate permease(BSU37040)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU07570 or BSU37040 or ( BSU04440 and
BSU04470 ) )</p>
      <p>GENE_LIST: BSU07570 BSU37040 BSU04440 BSU04470</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00497_e"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00497_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
  <reaction id="R_rxn05605" name="TRAP-type C4-dicarboxylate transport system,
periplasmic component;C4-dicarboxylate transport protein(BSU04470);2-oxoglutarate/malate
translocator(BSU07570);Malate permease(BSU37040);L-Malate Citrate symporter (TC
2.A.24.2.4)(BSU38770)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU38770 or BSU07570 or BSU37040 or ( BSU04440 and
BSU04470 ) )</p>
      <p>GENE_LIST: BSU38770 BSU07570 BSU37040 BSU04440 BSU04470</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00149_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00149_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>

```

```

</kineticLaw>
</reaction>
<reaction id="R_rxn05607" name="PTS system, maltose and glucose-specific IIB component
(EC 2.7.1.69)PTS system, maltose and glucose-specific IIC component (EC
2.7.1.69);Phosphoenolpyruvate-protein phosphotransferase of PTS system (EC
2.7.3.9)(BSU13910);Phosphocarrier protein of PTS system(BSU13900)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU13900 and BSU13910 and BSU08200 )</p>
      <p>GENE_LIST: BSU13900 BSU13910 BSU08200</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00074_c"/>
    <speciesReference species="M_C00208_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00022_c"/>
    <speciesReference species="M_C02995_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05608" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01835_e"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C01835_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05609" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00636_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00636_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_rxn05610" name="Phosphocarrier protein of PTS system"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU12010 and BSU13900 and BSU13910 )</p>
      <p>GENE_LIST: BSU12010 BSU13900 BSU13910</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00074_c"/>
    <speciesReference species="M_C00159_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00022_c"/>
    <speciesReference species="M_C00275_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05611" name="Glucose/mannose:H+ symporter GlcP">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU10520</p>
      <p>GENE_LIST: BSU10520</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00159_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00159_c"/>
  </listOfProducts>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05612" name="Melibiose carrier protein, Na+/melibiose symporter">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU12310</p>
      <p>GENE_LIST: BSU12310</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C05402_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C05402_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05616" name="Magnesium and cobalt transport protein CorA;Magnesium
transporter(BSU13300);Magnesium and cobalt transport protein corA(BSU24740)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

<p>GENE\_ASSOCIATION: ( BSU13300 or BSU24740 or BSU08000 )</p>  
 <p>GENE\_LIST: BSU13300 BSU24740 BSU08000</p>  
 <p>SUBSYSTEM: Membrane Transport</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00305\_e"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00305\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_rxn05617" name="Phosphoenolpyruvate-protein phosphotransferase of PTS system (EC 2.7.3.9);Phosphocarrier protein of PTS system(BSU13900)" reversible="false">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: ( BSU13900 and BSU13910 and BSU03981 )</p>  
 <p>GENE\_LIST: BSU13900 BSU13910 BSU03981</p>  
 <p>SUBSYSTEM: Membrane Transport</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00074\_c"/>  
 <speciesReference species="M\_C00392\_e"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00022\_c"/>  
 <speciesReference species="M\_C00644\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>



```

    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05618" name="Manganese transport protein MntH" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU04360</p>
      <p>GENE_LIST: BSU04360</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00034_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00034_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05619" name="Predicted molybdate-responsive regulator YvgK in
bacilli;Molybdenum ABC transporter, periplasmic molybdenum-binding protein modA (TC
3.A.1.8.1)(BSU33380);Molybdenum transport system permease protein modB (TC
3.A.1.8.1)(BSU33390)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU33370 and BSU33380 and BSU33390 )</p>
      <p>GENE_LIST: BSU33370 BSU33380 BSU33390</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C06232_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C06232_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05620" name="Alkanesulfonates ABC transporter ATP-binding
protein;Alkanesulfonates-binding protein(BSU08840);Alkanesulfonates transport
system permease protein(BSU08850)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU08830 and BSU08840 and BSU08850 )</p>
      <p>GENE_LIST: BSU08830 BSU08840 BSU08850</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11575_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd11575_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05621" name="Alkanesulfonates ABC transporter ATP-binding
protein;Alkanesulfonates-binding protein(BSU08840);Alkanesulfonates transport system
permease protein(BSU08850)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU08830 and BSU08840 and BSU08850 )</p>
      <p>GENE_LIST: BSU08830 BSU08840 BSU08850</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C11145_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C11145_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05622" name="catalyses ATP-dependent electrogenic Na+ extrusion
without mechanistically coupled H+ or K+ uptake" reversible="false">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: ( BSU02750 and BSU02760 )</p>
    <p>GENE_LIST: BSU02750 BSU02760</p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C01330_c"/>
  <speciesReference species="M_C00001_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C01330_e"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05625" name="Nitrate/nitrite transporter;Formate/nitrite family of
transporters(BSU38060)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU38060 or BSU03330 )</p>
      <p>GENE_LIST: BSU38060 BSU03330</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00088_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>

```

```

    <speciesReference species="M_C00088_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05626" name="Nitrate/nitrite transporter" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU37320</p>
      <p>GENE_LIST: BSU37320</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00088_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00088_e"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05627" name="Nitrate/nitrite transporter">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU03330 or BSU37320 )</p>

```

```

    <p>GENE_LIST: BSU03330 BSU37320</p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C00244_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00244_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05628" name="Arginine/ornithine antiporter ArcD" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU33330</p>
      <p>GENE_LIST: BSU33330</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00077_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00077_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05629" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C01742_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01742_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05630" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00074_e"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00074_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05634" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00163_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00163_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05635" name="" reversible="false">

```



```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00013_e"/>
  <speciesReference species="M_C00001_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00013_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05636" name="Xanthine permease">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU32430 and BSU32440 )</p>
      <p>GENE_LIST: BSU32430 BSU32440</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00366_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00366_c"/>
  </listOfProducts>
</reaction>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05639" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C02532_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C02532_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05640" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C01005_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C01005_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05641" name="resistance to puromycin, nerfloxacin, tosufloxacin, but not
CCCP" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU03070</p>
      <p>GENE_LIST: BSU03070</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01610_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01610_e"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05643" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00492_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00492_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05644" name="Ribose ABC transport system, ATP-binding protein RbsA
(TC 3.A.1.2.1);Ribose ABC transport system, high affinity permease RbsD (TC
3.A.1.2.1)(BSU35930);Ribose ABC transport system, permease protein RbsC (TC
3.A.1.2.1)(BSU35950);Ribose ABC transport system, periplasmic ribose-binding protein RbsB
(TC 3.A.1.2.1)(BSU35960)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU35930 and BSU35940 and BSU35950 and

```

```

BSU35960 )</p>
  <p>GENE_LIST: BSU35930 BSU35940 BSU35950 BSU35960</p>
  <p>SUBSYSTEM: Carbohydrates</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00121_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00121_e"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05645" name="Substrate-specific component RibU of riboflavin ECF
transporter">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU23050</p>
      <p>GENE_LIST: BSU23050</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00255_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00255_c"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05646" name="Predicted rhamnose oligosaccharide ABC transport
system, substrate-binding component;Predicted rhamnose oligosaccharide ABC transport system,
permease component 2(BSU06980);Predicted rhamnose oligosaccharide ABC transport system,
permease component(BSU06990);ABC-type polysaccharide transport system, permease
component(BSU07110)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU06970 and BSU06980 and BSU06990 ) or
BSU07110 )</p>
      <p>GENE_LIST: BSU06970 BSU06980 BSU06990 BSU07110</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00507_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00507_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05647" name="Phosphoenolpyruvate-protein phosphotransferase of PTS

```

system (EC 2.7.3.9);PTS system, beta-glucoside-specific IIA component (EC 2.7.1.69)|PTS system, beta-glucoside-specific IIB component (EC 2.7.1.69)|PTS system, beta-glucoside-specific IIC component (EC 2.7.1.69)(BSU39270);Phosphocarrier protein of PTS system(BSU13900)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU13900 and BSU13910 and BSU39270 )</p>

<p>GENE\_LIST: BSU13900 BSU13910 BSU39270</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00074\_c"/>

<speciesReference species="M\_C01451\_e"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00022\_c"/>

<speciesReference species="M\_C06188\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05648" name="Glucitol/sorbitol-specific transport protein gutA">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU06160</p>

<p>GENE\_LIST: BSU06160</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_e"/>

<speciesReference species="M\_C00794\_e"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00080\_c"/>

```

    <speciesReference species="M_C00794_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05649" name="D-serine/D-alanine/glycine transporter">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU05620 or BSU27090 )</p>
      <p>GENE_LIST: BSU05620 BSU27090</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00740_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00740_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05651" name="Sulfate permease;Sulfate permease,
Pit-type(BSU15580)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```



```

    <p>GENE_ASSOCIATION: ( BSU15580 or BSU01580 or BSU34660 )</p>
    <p>GENE_LIST: BSU15580 BSU01580 BSU34660</p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C00059_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00059_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05653" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00247_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00247_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05654" name="TRAP-type C4-dicarboxylate transport system,
periplasmic component;C4-dicarboxylate transport protein(BSU04470)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU04440 and BSU04470 )</p>
      <p>GENE_LIST: BSU04440 BSU04470</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00042_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00042_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05655" name="Phosphoenolpyruvate-protein phosphotransferase of PTS
system (EC 2.7.3.9);PTS system, sucrose-specific IIB component (EC 2.7.1.69)|PTS system,
sucrose-specific IIC component (EC 2.7.1.69)(BSU38050);PTS system, sucrose-specific IIB
component; PTS system, sucrose-specific IIC component(BSU38410);Phosphocarrier protein of
PTS system(BSU13900)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU13900 and BSU13910 and BSU38050 )</p>
      <p>GENE_LIST: BSU13900 BSU13910 BSU38050</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00074_c"/>
  <speciesReference species="M_C00089_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00022_c"/>
  <speciesReference species="M_C16688_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05656" name="Alkanesulfonates ABC transporter ATP-binding
protein;Alkanesulfonates-binding protein(BSU08840);Alkanesulfonates transport system
permease protein(BSU08850)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU08830 and BSU08840 and BSU08850 )</p>
      <p>GENE_LIST: BSU08830 BSU08840 BSU08850</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C14179_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C14179_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </kineticLaw>

```

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05657" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C02086_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C02086_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05661" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>

```

```

    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C02466_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C02466_e"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05663" name="Substrate-specific component TrpP of tryptophan ECF
transporter">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU10010</p>
      <p>GENE_LIST: BSU10010</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00078_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00078_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05665" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00105_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00105_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05667" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00086_e"/>
  </listOfReactants>
  <listOfProducts>

```

```

    <speciesReference species="M_C00086_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05669" name="Branched-chain amino acid transport system carrier protein;branched-chain amino acid transport(BSU26700);branched-chain amino acid transport(BSU26710)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( ( BSU26690 and BSU26700 and BSU26710 ) or BSU29600 )</p>
      <p>GENE_LIST: BSU26690 BSU26700 BSU26710 BSU29600</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00183_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00183_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05671" name="Xyloside transporter XynT;Arabinose-proton

```

symporter(BSU33960)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU17570</p>

<p>GENE\_LIST: BSU17570</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_e"/>

<speciesReference species="M\_C00181\_e"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00181\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn05672" name="">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: </p>

<p>GENE\_LIST: </p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_e"/>

<speciesReference species="M\_C00217\_e"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00217\_c"/>

</listOfProducts>

<kineticLaw>



```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05673" name="Hexuronate transporter">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU12360</p>
      <p>GENE_LIST: BSU12360</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00333_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00333_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05674" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C00327_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00327_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05676" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00275_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00275_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05678" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00530_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00530_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05679" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00364_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>

```

```

    <speciesReference species="M_C00364_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05680" name="Cytosine/purine/uracil/thiamine/allantoin permease family
protein;Purine-cytosine permease(BSU38710)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU38710 or BSU36470 )</p>
      <p>GENE_LIST: BSU38710 BSU36470</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C01762_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01762_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05681" name="2-keto-3-deoxygluconate permease (KDG permease)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

```

    <p>GENE_ASSOCIATION: BSU22090</p>
    <p>GENE_LIST: BSU22090</p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C00204_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00204_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05682" name="Cytosine/purine/uracil/thiamine/allantoin permease family
protein">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU36470</p>
      <p>GENE_LIST: BSU36470</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C02350_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C02350_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>

```

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05691" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C01019_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01019_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05694" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C01879_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01879_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05697" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C06468_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C06468_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_rxn05699" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C08240_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C08240_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05700" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C08325_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C08325_c"/>
  </listOfProducts>

```



```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05714" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C03570_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C03570_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05716" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>

```

```

</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C00346_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00346_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05717" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00536_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00536_e"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05718" name="">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: </p>
            <p>GENE_LIST: </p>
            <p>SUBSYSTEM: Membrane Transport</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00080_e"/>
        <speciesReference species="M_C00588_e"/>
    </listOfReactants>
    <listOfProducts>
        <speciesReference species="M_C00080_c"/>
        <speciesReference species="M_C00588_c"/>
    </listOfProducts>
    <kineticLaw>
        <math xmlns="http://www.w3.org/1998/Math/MathML">
            <ci> FLUX_VALUE </ci>
        </math>
        <listOfParameters>
            <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
            <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
            <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
        </listOfParameters>
    </kineticLaw>
</reaction>
<reaction id="R_rxn05721" name="">
    <notes>
        <html xmlns="http://www.w3.org/1999/xhtml">
            <p>GENE_ASSOCIATION: </p>
            <p>GENE_LIST: </p>
            <p>SUBSYSTEM: Membrane Transport</p>
        </html>
    </notes>
    <listOfReactants>
        <speciesReference species="M_C00080_e"/>
        <speciesReference species="M_C00946_e"/>
    </listOfReactants>
    <listOfProducts>

```

```

    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00946_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05722" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C01081_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01081_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05724" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

```

    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C03104_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C03104_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05727" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C06369_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C06369_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05732" name="Acyl-CoA dehydrogenase, short-chain specific (EC
1.3.99.2)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU37170 or BSU32820 or BSU04520 )</p>
      <p>GENE_LIST: BSU37170 BSU32820 BSU04520</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C05272_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00154_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05734" name="Aldehyde dehydrogenase (EC 1.2.1.3)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU19310 or BSU38830 or BSU39860 or BSU07350 or
BSU37960 )</p>
      <p>GENE_LIST: BSU19310 BSU38830 BSU39860 BSU07350 BSU37960</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00048_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c" stoichiometry="2"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_C00209_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05735" name="Aldehyde dehydrogenase (EC 1.2.1.3)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU19310 or BSU38830 or BSU39860 or BSU07350 or
BSU37960 )</p>
      <p>GENE_LIST: BSU19310 BSU38830 BSU39860 BSU07350 BSU37960</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C06735_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00037_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>

```

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05736" name="Long-chain-fatty-acid--CoA ligase (EC
6.2.1.3);Acetoacetyl-CoA synthetase [leucine] (EC 6.2.1.16)|Long-chain-fatty-acid--CoA ligase
(EC 6.2.1.3)(BSU18250)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU10270 or BSU10360 or BSU28560 or BSU18250 or
BSU17180 or BSU04170 )</p>
      <p>GENE_LIST: BSU10270 BSU10360 BSU28560 BSU18250 BSU17180
BSU04170</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C06424_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C02593_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05737" name="Alkanesulfonate monooxygenase (EC 1.14.14.5)"
reversible="false">

```



```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: BSU08860</p>
    <p>GENE_LIST: BSU08860</p>
    <p>SUBSYSTEM: Sulfur Metabolism</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00007_c"/>
  <speciesReference species="M_C01847_c"/>
  <speciesReference species="M_C00245_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C00061_c"/>
  <speciesReference species="M_C11481_c"/>
  <speciesReference species="M_C06735_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05739" name="Aerobic glycerol-3-phosphate dehydrogenase (EC
1.1.99.5)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU09300</p>
      <p>GENE_LIST: BSU09300</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00093_c"/>
    <speciesReference species="M_cpd11606_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00111_c"/>

```

```

    <speciesReference species="M_C00828_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05740" name="Glycogen phosphorylase (EC 2.4.1.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30940</p>
      <p>GENE_LIST: BSU30940</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00182_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00103_c"/>
    <speciesReference species="M_cpd15302_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn05746" name="Oligo-1,6-glucosidase (EC 3.2.1.10);Neopullulanase (EC 3.2.1.135)(BSU34560)">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: ( BSU34560 or BSU02840 )</p>
  <p>GENE_LIST: BSU34560 BSU02840</p>
  <p>SUBSYSTEM: Carbohydrates</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_C01835_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00267_c"/>
  <speciesReference species="M_C00208_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05747" name="NADH dehydrogenase (EC 1.6.99.3)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU12290 or BSU32100 or BSU32200 )</p>
      <p>GENE_LIST: BSU12290 BSU32100 BSU32200</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_cpd11606_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00828_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05748" name="Respiratory nitrate reductase gamma chain (EC
1.7.99.4);Respiratory nitrate reductase beta chain (EC 1.7.99.4)(BSU37270);Respiratory nitrate
reductase alpha chain (EC 1.7.99.4)(BSU37280);Respiratory nitrate reductase delta chain (EC
1.7.99.4)(BSU37260)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU37250 and BSU37260 and BSU37270 and
BSU37280 )</p>
      <p>GENE_LIST: BSU37250 BSU37260 BSU37270 BSU37280</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00244_c"/>
    <speciesReference species="M_C00828_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_e" stoichiometry="2"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00088_c"/>
    <speciesReference species="M_cpd11606_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn06991" name="1-hydroxy-2-methyl-2-(E)-butenyl 4-diphosphate

```

synthase (EC 1.17.4.3)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU25070</p>

<p>GENE\_LIST: BSU25070</p>

<p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C11453\_c"/>

<speciesReference species="M\_C02315\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_C02582\_c"/>

<speciesReference species="M\_C11811\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn08025" name="6-phospho-beta-glucosidase (EC 3.2.1.86)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU40110</p>

<p>GENE\_LIST: BSU40110</p>

<p>SUBSYSTEM: Carbohydrates</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_C06187\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00668\_c"/>

<speciesReference species="M\_C00530\_c"/>

</listOfProducts>

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn08040" name="Undecaprenyl-phosphate N-acetylglucosaminyl
1-phosphate transferase (EC 2.7.8.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35530</p>
      <p>GENE_LIST: BSU35530</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00348_c"/>
    <speciesReference species="M_C00043_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00105_c"/>
    <speciesReference species="M_C01289_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn08100" name="L-alanine-DL-glutamate epimerase">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU12980</p>
      <p>GENE_LIST: BSU12980</p>

```

```

    <p>SUBSYSTEM: Carbohydrates</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_cpd15385_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_cpd15388_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn08171" name="Arsenate reductase (EC 1.20.4.1);Arsenate reductase
family protein(BSU24770);Arsenate reductase family protein(BSU11500)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU11500 or BSU24770 or BSU25780 or
BSU32810 )</p>
      <p>GENE_LIST: BSU11500 BSU24770 BSU25780 BSU32810</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00051_c" stoichiometry="2"/>
    <speciesReference species="M_cpd01048_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C06697_c"/>
    <speciesReference species="M_C00127_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn08180" name="Biotin synthase (EC 2.8.1.6)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30200</p>
      <p>GENE_LIST: BSU30200</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00019_c"/>
    <speciesReference species="M_C01909_c"/>
    <speciesReference species="M_C00087_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00073_c"/>
    <speciesReference species="M_C00120_c"/>
    <speciesReference species="M_C05198_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn08295" name="Diacylglycerol kinase (EC 2.7.1.107)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25310</p>
      <p>GENE_LIST: BSU25310</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>

```



```

</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_cpd15307_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_cpd15522_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn08297" name="Diacylglycerol kinase (EC 2.7.1.107)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25310</p>
      <p>GENE_LIST: BSU25310</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_cpd15309_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_cpd15524_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn08299" name="Diacylglycerol kinase (EC 2.7.1.107)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25310</p>
      <p>GENE_LIST: BSU25310</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_cpd15311_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_cpd15526_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn08307" name="Phosphatidate cytidyltransferase (EC 2.7.7.41)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16540</p>
      <p>GENE_LIST: BSU16540</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00063_c"/>
    <speciesReference species="M_cpd15522_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>

```

```

    <speciesReference species="M_cpd15423_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn08309" name="Phosphatidate cytidyltransferase (EC 2.7.7.41)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16540</p>
      <p>GENE_LIST: BSU16540</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00063_c"/>
    <speciesReference species="M_cpd15524_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_cpd15419_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn08311" name="Phosphatidate cytidyltransferase (EC 2.7.7.41)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16540</p>

```

<p>GENE\_LIST: BSU16540</p>  
 <p>SUBSYSTEM: Fatty Acids and Lipids</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00063\_c"/>  
 <speciesReference species="M\_cpd15526\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00013\_c"/>  
 <speciesReference species="M\_cpd15421\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_rxn08467" name="Alkanesulfonate monooxygenase (EC 1.14.14.5)"  
 reversible="false">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: BSU08860</p>  
 <p>GENE\_LIST: BSU08860</p>  
 <p>SUBSYSTEM: Sulfur Metabolism</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00007\_c"/>  
 <speciesReference species="M\_C01847\_c"/>  
 <speciesReference species="M\_C05123\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00001\_c"/>  
 <speciesReference species="M\_C00061\_c"/>  
 <speciesReference species="M\_C11481\_c"/>  
 <speciesReference species="M\_C00266\_c"/>  
 </listOfProducts>  
 <kineticLaw>

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn08468" name="Alkanesulfonate monooxygenase (EC 1.14.14.5)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08860</p>
      <p>GENE_LIST: BSU08860</p>
      <p>SUBSYSTEM: Sulfur Metabolism</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C01847_c"/>
    <speciesReference species="M_C11145_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00061_c"/>
    <speciesReference species="M_C11481_c"/>
    <speciesReference species="M_C00067_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn08469" name="Alkanesulfonate monooxygenase (EC 1.14.14.5)"
reversible="false">
  <notes>

```

```

    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08860</p>
      <p>GENE_LIST: BSU08860</p>
      <p>SUBSYSTEM: Sulfur Metabolism</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C01847_c"/>
    <speciesReference species="M_cpd11579_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00061_c"/>
    <speciesReference species="M_C11481_c"/>
    <speciesReference species="M_C00084_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn08470" name="Alkanesulfonate monooxygenase (EC 1.14.14.5)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08860</p>
      <p>GENE_LIST: BSU08860</p>
      <p>SUBSYSTEM: Sulfur Metabolism</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C01847_c"/>
    <speciesReference species="M_cpd11596_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>

```

```

    <speciesReference species="M_C00061_c"/>
    <speciesReference species="M_C11481_c"/>
    <speciesReference species="M_C01412_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn08471" name="Alkanesulfonate monooxygenase (EC 1.14.14.5)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU08860</p>
      <p>GENE_LIST: BSU08860</p>
      <p>SUBSYSTEM: Sulfur Metabolism</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00007_c"/>
    <speciesReference species="M_C01847_c"/>
    <speciesReference species="M_C14179_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00048_c"/>
    <speciesReference species="M_C00061_c"/>
    <speciesReference species="M_C11481_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </kineticLaw>
  </reaction>
  <reaction id="R_rxn08615" name="Glycogen synthase, ADP-glucose transglucosylase (EC
2.4.1.21)">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU30950</p>
        <p>GENE_LIST: BSU30950</p>
        <p>SUBSYSTEM: Carbohydrates</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00498_c"/>
      <speciesReference species="M_cpd15302_c"/>
    </listOfReactants>
    <listOfProducts>
      <speciesReference species="M_C00008_c"/>
      <speciesReference species="M_C00182_c"/>
    </listOfProducts>
    <kineticLaw>
      <math xmlns="http://www.w3.org/1998/Math/MathML">
        <ci> FLUX_VALUE </ci>
      </math>
      <listOfParameters>
        <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
      </listOfParameters>
    </kineticLaw>
  </reaction>
  <reaction id="R_rxn08669" name="Glycerophosphoryl diester phosphodiesterase, periplasmic
(EC 3.1.4.46);Glycerophosphoryl diester phosphodiesterase (EC
3.1.4.46)(BSU09620);Glycerophosphoryl diester phosphodiesterase family protein(BSU24180)">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: ( BSU02130 or BSU09620 or BSU24180 )</p>
        <p>GENE_LIST: BSU02130 BSU09620 BSU24180</p>
        <p>SUBSYSTEM: Carbohydrates</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00001_c"/>
      <speciesReference species="M_C03274_c"/>
    </listOfReactants>

```



```

<listOfProducts>
  <speciesReference species="M_C00093_c"/>
  <speciesReference species="M_C00116_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn08707" name="Heme O synthase, protoheme IX farnesyltransferase (EC
2.5.1.-) COX10-CtaB">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU12080 or BSU14880 )</p>
      <p>GENE_LIST: BSU12080 BSU14880</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00032_c"/>
    <speciesReference species="M_C00448_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C15672_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

<reaction id="R_rxn08775" name="L-alanoyl-D-glutamate peptidase">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02810</p>
      <p>GENE_LIST: BSU02810</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd15388_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00025_c"/>
    <speciesReference species="M_C00041_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

<reaction id="R_rxn09011" name="Nucleoside 5-triphosphatase RdgB (dHAPTP, dITP,
XTP-specific) (EC 3.6.1.15)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU28360</p>
      <p>GENE_LIST: BSU28360</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C01345_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01344_c"/>
  </listOfProducts>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn09012" name="Nucleoside 5-triphosphatase RdgB (dHAPTP, dITP,
XTP-specific) (EC 3.6.1.15)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU28360</p>
      <p>GENE_LIST: BSU28360</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00700_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C01337_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn09063" name="Diacylglycerol kinase (EC 2.7.1.107)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

```

    <p>GENE_ASSOCIATION: BSU25310</p>
    <p>GENE_LIST: BSU25310</p>
    <p>SUBSYSTEM: Fatty Acids and Lipids</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_cpd15522_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_cpd15307_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn09065" name="Diacylglycerol kinase (EC 2.7.1.107)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25310</p>
      <p>GENE_LIST: BSU25310</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd15524_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd15309_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn09067" name="Diacylglycerol kinase (EC 2.7.1.107)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25310</p>
      <p>GENE_LIST: BSU25310</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd15526_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd15311_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn09102" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_cpd15543_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_cpd15536_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn09104" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd15545_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd15538_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn09106" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd15547_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd15540_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn09109" name="CDP-diacylglycerol--glycerol-3-phosphate
3-phosphatidyltransferase (EC 2.7.8.5)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16920</p>
      <p>GENE_LIST: BSU16920</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd15423_c"/>

```

```

    <speciesReference species="M_C00093_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00055_c"/>
    <speciesReference species="M_cpd15543_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction      id="R_rxn09111"      name="CDP-diacylglycerol--glycerol-3-phosphate
3-phosphatidyltransferase (EC 2.7.8.5)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16920</p>
      <p>GENE_LIST: BSU16920</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00093_c"/>
    <speciesReference species="M_cpd15419_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00055_c"/>
    <speciesReference species="M_cpd15545_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```



```

</reaction>
<reaction id="R_rxn09113" name="CDP-diacylglycerol--glycerol-3-phosphate
3-phosphatidyltransferase (EC 2.7.8.5)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16920</p>
      <p>GENE_LIST: BSU16920</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00093_c"/>
    <speciesReference species="M_cpd15421_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00055_c"/>
    <speciesReference species="M_cpd15547_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn09198" name="Phosphatidylserine decarboxylase (EC 4.1.1.65)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02290</p>
      <p>GENE_LIST: BSU02290</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_cpd15553_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_cpd15529_c"/>
  </listOfProducts>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn09200" name="Phosphatidylserine decarboxylase (EC 4.1.1.65)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02290</p>
      <p>GENE_LIST: BSU02290</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_cpd15555_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_cpd15531_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn09202" name="Phosphatidylserine decarboxylase (EC 4.1.1.65)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02290</p>
      <p>GENE_LIST: BSU02290</p>

```

```

    <p>SUBSYSTEM: Fatty Acids and Lipids</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_c" stoichiometry="2"/>
  <speciesReference species="M_cpd15557_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00011_c"/>
  <speciesReference species="M_cpd15533_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn09206" name="CDP-diacylglycerol--serine O-phosphatidyltransferase
(EC 2.7.8.8)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02270</p>
      <p>GENE_LIST: BSU02270</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00065_c"/>
    <speciesReference species="M_cpd15423_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00055_c"/>
    <speciesReference species="M_cpd15553_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn09208" name="CDP-diacylglycerol--serine O-phosphatidyltransferase
(EC 2.7.8.8)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02270</p>
      <p>GENE_LIST: BSU02270</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00065_c"/>
    <speciesReference species="M_cpd15419_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00055_c"/>
    <speciesReference species="M_cpd15555_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </kineticLaw>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn09210" name="CDP-diacylglycerol--serine O-phosphatidyltransferase
(EC 2.7.8.8)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02270</p>
      <p>GENE_LIST: BSU02270</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00065_c"/>
  <speciesReference species="M_cpd15421_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00055_c"/>
  <speciesReference species="M_cpd15557_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn09212" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C12147_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00188_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn09264" name="spermine/spermidine acetyltransferase"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU26600</p>
      <p>GENE_LIST: BSU26600</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C00315_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C00612_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn09340" name="5'-nucleotidase (EC 3.1.3.5)|UDP-sugar hydrolase (EC
3.6.1.45)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32370</p>
      <p>GENE_LIST: BSU32370</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00203_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00105_c"/>
    <speciesReference species="M_cpd15390_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn09341" name="5'-nucleotidase (EC 3.1.3.5)|UDP-sugar hydrolase (EC
3.6.1.45)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU32370</p>
      <p>GENE_LIST: BSU32370</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00043_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00105_c"/>
    <speciesReference species="M_C04501_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>

```

```

    </kineticLaw>
  </reaction>
  <reaction id="R_rxn09348" name="5'-nucleotidase (EC 3.1.3.5)|UDP-sugar hydrolase (EC
3.6.1.45)" reversible="false">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU32370</p>
        <p>GENE_LIST: BSU32370</p>
        <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00001_c"/>
      <speciesReference species="M_C00052_c"/>
    </listOfReactants>
    <listOfProducts>
      <speciesReference species="M_C00105_c"/>
      <speciesReference species="M_C00446_c"/>
    </listOfProducts>
    <kineticLaw>
      <math xmlns="http://www.w3.org/1998/Math/MathML">
        <ci> FLUX_VALUE </ci>
      </math>
      <listOfParameters>
        <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
        <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
      </listOfParameters>
    </kineticLaw>
  </reaction>
  <reaction id="R_rxn09355" name="5'-nucleotidase (EC 3.1.3.5)|UDP-sugar hydrolase (EC
3.6.1.45)" reversible="false">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU32370</p>
        <p>GENE_LIST: BSU32370</p>
        <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00001_c"/>
      <speciesReference species="M_C00167_c"/>
    </listOfReactants>
    <listOfProducts>

```



```

    <speciesReference species="M_C00105_c"/>
    <speciesReference species="M_C05385_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn09399" name="1,4-alpha-glucan (glycogen) branching enzyme,
GH-13-type (EC 2.4.1.18)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU30980</p>
      <p>GENE_LIST: BSU30980</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00718_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00182_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn09448" name="Long-chain-fatty-acid--CoA ligase (EC
6.2.1.3);Acetoacetyl-CoA synthetase [leucine] (EC 6.2.1.16)|Long-chain-fatty-acid--CoA ligase
(EC 6.2.1.3)(BSU18250)" reversible="false">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: ( BSU10270 or BSU28560 or BSU18250 or BSU10360 or
BSU17180 or BSU04170 )</p>
  <p>GENE_LIST:   BSU10270   BSU28560   BSU18250   BSU10360   BSU17180
BSU04170</p>
  <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00010_c"/>
  <speciesReference species="M_cpd15269_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00013_c"/>
  <speciesReference species="M_C00020_c"/>
  <speciesReference species="M_cpd15274_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn09449" name="Long-chain-fatty-acid--CoA ligase (EC
6.2.1.3);Acetoacetyl-CoA synthetase [leucine] (EC 6.2.1.16)|Long-chain-fatty-acid--CoA ligase
(EC 6.2.1.3)(BSU18250)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU10270 or BSU28560 or BSU18250 or BSU10360 or
BSU17180 or BSU04170 )</p>
      <p>GENE_LIST:   BSU10270   BSU28560   BSU18250   BSU10360   BSU17180
BSU04170</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>

```

```

    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C01530_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_C00412_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn09450" name="Long-chain-fatty-acid--CoA ligase (EC
6.2.1.3);Acetoacetyl-CoA synthetase [leucine] (EC 6.2.1.16)|Long-chain-fatty-acid--CoA ligase
(EC 6.2.1.3)(BSU18250)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU10270 or BSU28560 or BSU18250 or BSU10360 or
BSU17180 or BSU04170 )</p>
      <p>GENE_LIST: BSU10270 BSU28560 BSU18250 BSU10360 BSU17180
BSU04170</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd15237_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_cpd15238_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn09562" name="Guanylate kinase (EC 2.7.4.8)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU15680</p>
      <p>GENE_LIST: BSU15680</p>
      <p>SUBSYSTEM: Nucleosides and Nucleotides</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00144_c"/>
    <speciesReference species="M_C00131_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00035_c"/>
    <speciesReference species="M_C00206_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn09657" name="Xanthine/uracil/thiamine/ascorbate permease family
protein;Cytosine/purine/uracil/thiamine/allantoin permease family protein(BSU36470)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU36470 or BSU06370 or BSU29990 )</p>
      <p>GENE_LIST: BSU36470 BSU06370 BSU29990</p>
    </html>
  </notes>

```

<p>SUBSYSTEM: Membrane Transport</p>  
</html>  
</notes>  
<listOfReactants>  
<speciesReference species="M\_C00080\_e"/>  
<speciesReference species="M\_C00378\_e"/>  
</listOfReactants>  
<listOfProducts>  
<speciesReference species="M\_C00080\_c"/>  
<speciesReference species="M\_C00378\_c"/>  
</listOfProducts>  
<kineticLaw>  
<math xmlns="http://www.w3.org/1998/Math/MathML">  
<ci> FLUX\_VALUE </ci>  
</math>  
<listOfParameters>  
<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
</listOfParameters>  
</kineticLaw>  
</reaction>  
<reaction id="R\_rxn09661" name="Glucitol/sorbitol-specific transport protein gutA">  
<notes>  
<html xmlns="http://www.w3.org/1999/xhtml">  
<p>GENE\_ASSOCIATION: BSU06160</p>  
<p>GENE\_LIST: BSU06160</p>  
<p>SUBSYSTEM: Membrane Transport</p>  
</html>  
</notes>  
<listOfReactants>  
<speciesReference species="M\_C01722\_e"/>  
</listOfReactants>  
<listOfProducts>  
<speciesReference species="M\_C01722\_c"/>  
</listOfProducts>  
<kineticLaw>  
<math xmlns="http://www.w3.org/1998/Math/MathML">  
<ci> FLUX\_VALUE </ci>  
</math>  
<listOfParameters>  
<parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn09889" name="Dihydroxy-acid dehydratase (EC 4.2.1.9)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU21870</p>
      <p>GENE_LIST: BSU21870</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C06007_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C06008_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn09907" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00037_c"/>
    <speciesReference species="M_C00073_c"/>
  </listOfReactants>
  <listOfProducts>

```

```

<speciesReference species="M_C00008_c"/>
<speciesReference species="M_C00009_c"/>
<speciesReference species="M_C00080_c"/>
<speciesReference species="M_cpd11591_c"/>
</listOfProducts>
<kineticLaw>
<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn09925" name="" reversible="false">
<notes>
<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: </p>
  <p>GENE_LIST: </p>
  <p>SUBSYSTEM: Amino Acids and Derivatives</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00064_c"/>
  <speciesReference species="M_C00037_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_cpd11580_c"/>
</listOfProducts>
<kineticLaw>
<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>

```

```

    </kineticLaw>
  </reaction>
  <reaction id="R_rxn09940" name="Peptide methionine sulfoxide reductase msrB (EC
1.8.4.12)">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU21680</p>
        <p>GENE_LIST: BSU21680</p>
        <p>SUBSYSTEM: Amino Acids and Derivatives</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00342_c"/>
      <speciesReference species="M_cpd11576_c"/>
    </listOfReactants>
    <listOfProducts>
      <speciesReference species="M_C00001_c"/>
      <speciesReference species="M_C00343_c"/>
      <speciesReference species="M_C00073_c"/>
    </listOfProducts>
    <kineticLaw>
      <math xmlns="http://www.w3.org/1998/Math/MathML">
        <ci> FLUX_VALUE </ci>
      </math>
      <listOfParameters>
        <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
      </listOfParameters>
    </kineticLaw>
  </reaction>
  <reaction id="R_rxn09944" name="Methylmalonate-semialdehyde dehydrogenase [inositol]
(EC 1.2.1.27)">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU39760</p>
        <p>GENE_LIST: BSU39760</p>
        <p>SUBSYSTEM: Carbohydrates</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00010_c"/>
      <speciesReference species="M_C00003_c"/>
      <speciesReference species="M_C00479_c"/>

```



```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00100_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00004_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction      id="R_rxn09949"      name="spermine/spermidine      acetyltransferase"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU26600</p>
      <p>GENE_LIST: BSU26600</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00024_c" stoichiometry="2"/>
    <speciesReference species="M_C00750_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00010_c" stoichiometry="2"/>
    <speciesReference species="M_C03413_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>

```

```

</kineticLaw>
</reaction>
<reaction id="R_rxn09953" name="Dihydrolipoamide dehydrogenase of acetoin
dehydrogenase (EC 1.8.1.4);Acetoin dehydrogenase E1 component alpha-subunit (EC
1.2.4.-)(BSU08060);Acetoin dehydrogenase E1 component beta-subunit (EC
1.2.4.-)(BSU08070);Dihydrolipoamide acetyltransferase component (E2) of acetoin
dehydrogenase complex (EC 2.3.1.-)(BSU08080)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU08060 and BSU08070 and BSU08080 and
BSU08090 )</p>
      <p>GENE_LIST: BSU08060 BSU08070 BSU08080 BSU08090</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00810_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00024_c"/>
    <speciesReference species="M_C00084_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn09978" name="6-phospho-beta-glucosidase (EC
3.2.1.86)|Beta-glucosidase (EC 3.2.1.21)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU39260 or BSU03410 )</p>
      <p>GENE_LIST: BSU39260 BSU03410</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>

```

```

    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd15584_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00267_c"/>
    <speciesReference species="M_C00132_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn09979" name="6-phospho-beta-glucosidase (EC
3.2.1.86)|Beta-glucosidase (EC 3.2.1.21)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU39260 or BSU03410 )</p>
      <p>GENE_LIST: BSU39260 BSU03410</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd15585_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00267_c"/>
    <speciesReference species="M_C00132_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn09988" name="Alpha-N-arabinofuranosidase 2 (EC
3.2.1.55);Alpha-N-arabinofuranosidase (EC 3.2.1.55)(BSU28720)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU28720 or BSU28510 )</p>
      <p>GENE_LIST: BSU28720 BSU28510</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c" stoichiometry="2"/>
    <speciesReference species="M_C02474_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00259_c" stoichiometry="3"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn09989" name="Neopullulanase (EC 3.2.1.135)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU34560</p>
      <p>GENE_LIST: BSU34560</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c" stoichiometry="5"/>
    <speciesReference species="M_C00721_c"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00267_c" stoichiometry="6"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn09992" name="6-phospho-beta-glucosidase (EC 3.2.1.86)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU40110</p>
      <p>GENE_LIST: BSU40110</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C06188_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00668_c"/>
    <speciesReference species="M_C02323_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn09996" name="Putative teichuronic acid biosynthesis glycosyl transferase
TuaH;Putative N-acetylglactosaminyldiphosphoundecaprenol

```

glucuronosyltransferase(BSU35550);Putative teichuronic acid biosynthesis glycosyl transferase TuaC(BSU35590);Putative undecaprenyl-phosphate N-acetylgalactosaminyl 1-phosphate transferase|teichuronic acid biosynthesis glycosyltransferase TuaA(BSU35610);Teichuronic acid biosynthesis protein TuaF(BSU35560);Teichuronic acid biosynthesis protein TuaE, putative secreted polysaccharide polymerase(BSU35570);Teichuronic acid biosynthesis protein TuaB(BSU35600)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU35540 and BSU35550 and BSU35560 and BSU35570 and BSU35590 and BSU35600 and BSU35610 )</p>

<p>GENE\_LIST: BSU35540 BSU35550 BSU35560 BSU35570 BSU35590 BSU35600 BSU35610</p>

<p>SUBSYSTEM: Cell Wall and Capsule</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00203\_c" stoichiometry="45"/>

<speciesReference species="M\_C00167\_c" stoichiometry="45"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00080\_c" stoichiometry="45"/>

<speciesReference species="M\_C00105\_c" stoichiometry="45"/>

<speciesReference species="M\_C00015\_c" stoichiometry="45"/>

<speciesReference species="M\_cpd15634\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn10001" name="">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: </p>

<p>GENE\_LIST: </p>

<p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>

</html>

</notes>

```

<listOfReactants>
  <speciesReference species="M_C00032_c"/>
  <speciesReference species="M_C00097_c" stoichiometry="2"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C15817_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10002" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00007_c" stoichiometry="3"/>
    <speciesReference species="M_C00032_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_cpd15607_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_rxn10010" name="Acyl-CoA dehydrogenase, short-chain specific (EC
1.3.99.2)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU37170 or BSU32820 or BSU04520 )</p>
      <p>GENE_LIST: BSU37170 BSU32820 BSU04520</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C05271_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C05270_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10011" name="Acyl-CoA dehydrogenase, short-chain specific (EC
1.3.99.2)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU37170 or BSU32820 or BSU04520 )</p>
      <p>GENE_LIST: BSU37170 BSU32820 BSU04520</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C05276_c"/>
  </listOfReactants>

```



```

<listOfProducts>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C01944_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10012" name="Acyl-CoA dehydrogenase, short-chain specific (EC
1.3.99.2)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU37170 or BSU32820 or BSU04520 )</p>
      <p>GENE_LIST: BSU37170 BSU32820 BSU04520</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C05275_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C05274_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

<reaction id="R\_rxn10013" name="Acyl-CoA dehydrogenase, short-chain specific (EC 1.3.99.2)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU37170 or BSU32820 or BSU04520 )</p>

<p>GENE\_LIST: BSU37170 BSU32820 BSU04520</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00004\_c"/>

<speciesReference species="M\_C03221\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00003\_c"/>

<speciesReference species="M\_C01832\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn10014" name="Acyl-CoA dehydrogenase, short-chain specific (EC 1.3.99.2)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU37170 or BSU32820 or BSU04520 )</p>

<p>GENE\_LIST: BSU37170 BSU32820 BSU04520</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00004\_c"/>

<speciesReference species="M\_C05273\_c"/>

</listOfReactants>

<listOfProducts>

```

<speciesReference species="M_C00003_c"/>
<speciesReference species="M_C02593_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10042" name="ATP synthase beta chain (EC 3.6.3.14);ATP synthase
alpha chain (EC 3.6.3.14)(BSU36830);ATP synthase epsilon chain (EC 3.6.3.14)(BSU36800);ATP
synthase gamma chain (EC 3.6.3.14)(BSU36820);ATP synthase delta chain (EC
3.6.3.14)(BSU36840);ATP synthase B chain (EC 3.6.3.14)(BSU36850);ATP synthase C chain (EC
3.6.3.14)(BSU36860);ATP synthase A chain (EC 3.6.3.14)(BSU36870);ATP synthase protein
I(BSU36880)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU36800 and BSU36810 and BSU36820 and BSU36830
and BSU36840 and BSU36850 and BSU36860 and BSU36870 and BSU36880 )</p>
      <p>GENE_LIST: BSU36800 BSU36810 BSU36820 BSU36830 BSU36840 BSU36850
BSU36860 BSU36870 BSU36880</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_e" stoichiometry="4"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c" stoichiometry="3"/>
    <speciesReference species="M_C00001_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10043" name="Cytochrome c oxidase polypeptide II (EC
1.9.3.1);Cytochrome c oxidase polypeptide I (EC 1.9.3.1)(BSU14900);Cytochrome c oxidase
polypeptide III (EC 1.9.3.1)(BSU14910);Cytochrome c oxidase, subunit IV (EC
1.9.3.1)(BSU14920)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU14890 and BSU14900 and BSU14910 and
BSU14920 )</p>
      <p>GENE_LIST: BSU14890 BSU14900 BSU14910 BSU14920</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="6"/>
    <speciesReference species="M_C00007_c" stoichiometry="0.5"/>
    <speciesReference species="M_C00126_c" stoichiometry="2"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_e" stoichiometry="4"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00125_c" stoichiometry="2"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10044" name="Menaquinone-cytochrome C oxidoreductase, cytochrome
C subunit;Menaquinone-cytochrome c reductase, cytochrome B
subunit(BSU22550);Menaquinone-cytochrome C reductase iron-sulfur subunit(BSU22560)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

<p>GENE\_ASSOCIATION: ( BSU22540 and BSU22550 and BSU22560 )</p>

<p>GENE\_LIST: BSU22540 BSU22550 BSU22560</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>
</notes>
<listOfReactants>
<speciesReference species="M\_C00080\_c"/>
<speciesReference species="M\_C00125\_c" stoichiometry="2"/>
<speciesReference species="M\_C00828\_c"/>
</listOfReactants>
<listOfProducts>
<speciesReference species="M\_C00080\_e" stoichiometry="3"/>
<speciesReference species="M\_C00126\_c" stoichiometry="2"/>
<speciesReference species="M\_cpd11606\_c"/>
</listOfProducts>
<kineticLaw>
<math xmlns="http://www.w3.org/1998/Math/MathML">
<ci> FLUX\_VALUE </ci>
</math>
<listOfParameters>
<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>
<parameter id="UPPER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>
<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R\_rxn10045" name="Cytochrome d ubiquinol oxidase subunit I (EC 1.10.3.-);Cytochrome d ubiquinol oxidase subunit II (EC 1.10.3.-)(BSU38750);(BSU30720)" reversible="false">
<notes>
<html xmlns="http://www.w3.org/1999/xhtml">
<p>GENE\_ASSOCIATION: ( ( BSU30710 and BSU30720 ) or ( BSU38750 and BSU38760 ) )</p>
<p>GENE\_LIST: BSU30710 BSU30720 BSU38750 BSU38760</p>
<p>SUBSYSTEM: Membrane Transport</p>
</html>
</notes>
<listOfReactants>
<speciesReference species="M\_C00080\_c" stoichiometry="2"/>
<speciesReference species="M\_C00007\_c" stoichiometry="0.5"/>
<speciesReference species="M\_C00828\_c"/>
</listOfReactants>
<listOfProducts>
<speciesReference species="M\_C00080\_e" stoichiometry="2"/>

```

    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11606_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10046" name="AA3-600 quinol oxidase subunit IV;AA3-600 quinol
oxidase subunit III(BSU38150);AA3-600 quinol oxidase subunit I(BSU38160);AA3-600 quinol
oxidase subunit II(BSU38170)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU38140 and BSU38150 and BSU38160 and
BSU38170 )</p>
      <p>GENE_LIST: BSU38140 BSU38150 BSU38160 BSU38170</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="4"/>
    <speciesReference species="M_C00007_c" stoichiometry="0.5"/>
    <speciesReference species="M_C00828_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_e" stoichiometry="4"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd11606_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>

```

```

    </kineticLaw>
  </reaction>
  <reaction id="R_rxn10048" name="Heme A synthase, cytochrome oxidase biogenesis protein
Cox15-CtaA">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU14870</p>
        <p>GENE_LIST: BSU14870</p>
        <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00007_c"/>
      <speciesReference species="M_C15672_c"/>
    </listOfReactants>
    <listOfProducts>
      <speciesReference species="M_C00001_c"/>
      <speciesReference species="M_C15670_c"/>
    </listOfProducts>
    <kineticLaw>
      <math xmlns="http://www.w3.org/1998/Math/MathML">
        <ci> FLUX_VALUE </ci>
      </math>
      <listOfParameters>
        <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
      </listOfParameters>
    </kineticLaw>
  </reaction>
  <reaction id="R_rxn10056" name="NAD kinase (EC 2.7.1.23)" reversible="false">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU11610</p>
        <p>GENE_LIST: BSU11610</p>
        <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00003_c"/>
      <speciesReference species="M_C00044_c"/>
    </listOfReactants>
    <listOfProducts>
      <speciesReference species="M_C00006_c"/>

```

```

    <speciesReference species="M_C00035_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10057" name="NAD kinase (EC 2.7.1.23)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU11610</p>
      <p>GENE_LIST: BSU11610</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00131_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00206_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10058" name="NAD kinase (EC 2.7.1.23)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU11610</p>

```



<p>GENE\_LIST: BSU11610</p>  
 <p>SUBSYSTEM: Nucleosides and Nucleotides</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00003\_c"/>  
 <speciesReference species="M\_C00286\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00006\_c"/>  
 <speciesReference species="M\_C00361\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_rxn10059" name="NAD kinase (EC 2.7.1.23)" reversible="false">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: BSU11610</p>  
 <p>GENE\_LIST: BSU11610</p>  
 <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00458\_c"/>  
 <speciesReference species="M\_C00003\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00006\_c"/>  
 <speciesReference species="M\_C00705\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>

```

    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10060" name="NAD kinase (EC 2.7.1.23)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU11610</p>
      <p>GENE_LIST: BSU11610</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C00459_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00006_c"/>
    <speciesReference species="M_C00363_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10061" name="Dipicolinate synthase subunit A (EC
4.2.1.52);Dipicolinate synthase subunit B(BSU16740)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU16730 or BSU16740 )</p>
      <p>GENE_LIST: BSU16730 BSU16740</p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>

```

```

    <speciesReference species="M_C03340_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_cpd15596_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10062" name="Alcohol dehydrogenase GbsB (type III ), essential for the
utilization of choline (EC 1.1.1.1)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU31050</p>
      <p>GENE_LIST: BSU31050</p>
      <p>SUBSYSTEM: Amino Acids and Derivatives</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00016_c"/>
    <speciesReference species="M_C00114_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00576_c"/>
    <speciesReference species="M_C01352_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>

```

```

    </kineticLaw>
  </reaction>
  <reaction id="R_rxn10067" name="Alkanesulfonate monooxygenase (EC 1.14.14.5)"
reversible="false">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: BSU08860</p>
        <p>GENE_LIST: BSU08860</p>
        <p>SUBSYSTEM: Sulfur Metabolism</p>
      </html>
    </notes>
    <listOfReactants>
      <speciesReference species="M_C00007_c"/>
      <speciesReference species="M_C01847_c"/>
      <speciesReference species="M_cpd11578_c"/>
    </listOfReactants>
    <listOfProducts>
      <speciesReference species="M_C00001_c"/>
      <speciesReference species="M_C00061_c"/>
      <speciesReference species="M_C11481_c"/>
      <speciesReference species="M_cpd15611_c"/>
    </listOfProducts>
    <kineticLaw>
      <math xmlns="http://www.w3.org/1998/Math/MathML">
        <ci> FLUX_VALUE </ci>
      </math>
      <listOfParameters>
        <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
        <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
        <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
      </listOfParameters>
    </kineticLaw>
  </reaction>
  <reaction id="R_rxn10072" name="Glycine betaine ABC transport system, ATP-binding
protein OpuAA (EC 3.6.3.32);Glycine betaine ABC transport system, permease protein
OpuAB(BSU02990);Glycine betaine ABC transport system, glycine betaine-binding protein
OpuAC(BSU03000)" reversible="false">
    <notes>
      <html xmlns="http://www.w3.org/1999/xhtml">
        <p>GENE_ASSOCIATION: ( BSU02980 and BSU02990 and BSU03000 )</p>
        <p>GENE_LIST: BSU02980 BSU02990 BSU03000</p>
        <p>SUBSYSTEM: Membrane Transport</p>
      </html>
    </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00001_c"/>
  <speciesReference species="M_cpd15471_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_cpd15471_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10073" name="Glycine betaine ABC transport system, ATP-binding
protein OpuAA (EC 3.6.3.32);Glycine betaine ABC transport system, permease protein
OpuAB(BSU02990);Glycine betaine ABC transport system, glycine betaine-binding protein
OpuAC(BSU03000)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU02980 and BSU02990 and BSU03000 )</p>
      <p>GENE_LIST: BSU02980 BSU02990 BSU03000</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C10172_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C10172_c"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10191" name="D-alanine--poly(phosphoribitol) ligase subunit 1 (EC
6.1.1.13);D-alanine--poly(phosphoribitol) ligase subunit 2 (EC 6.1.1.13)(BSU38520);D-alanyl
transfer protein DltB(BSU38510);Poly(glycerophosphate chain) D-alanine transfer protein
DltD(BSU38530)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU38500 and BSU38510 and BSU38520 and
BSU38530 )</p>
      <p>GENE_LIST: BSU38500 BSU38510 BSU38520 BSU38530</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c" stoichiometry="45"/>
    <speciesReference species="M_C00133_c" stoichiometry="45"/>
    <speciesReference species="M_cpd15661_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c" stoichiometry="45"/>
    <speciesReference species="M_C00020_c" stoichiometry="45"/>
    <speciesReference species="M_cpd15663_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

<reaction id="R\_rxn10192" name="CDP-glycerol:poly(glycerophosphate) glycerophosphotransferase (EC 2.7.8.12);CDP-glycerol: N-acetyl-beta-D-mannosaminy-1,4-N-acetyl-D-glucosaminyldiphosphoundecaprenyl glycerophosphotransferase(BSU35760)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU35760 and BSU35720 )</p>

<p>GENE\_LIST: BSU35760 BSU35720</p>

<p>SUBSYSTEM: Cell Wall and Capsule</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00513\_c" stoichiometry="45"/>

<speciesReference species="M\_C04881\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00055\_c" stoichiometry="45"/>

<speciesReference species="M\_cpd15661\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn10193" name="Poly(glycerol-phosphate) alpha-glucosyltransferase (EC 2.4.1.52)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU35730</p>

<p>GENE\_LIST: BSU35730</p>

<p>SUBSYSTEM: Cell Wall and Capsule</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00029\_c" stoichiometry="45"/>

<speciesReference species="M\_cpd15661\_c"/>

</listOfReactants>

<listOfProducts>

```

    <speciesReference species="M_cpd15662_c"/>
    <speciesReference species="M_C00015_c" stoichiometry="45"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10194" name="Teichoic acid export ATP-binding protein TagH (EC
3.6.3.40);Teichoic acid translocation permease protein TagG(BSU35710)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU35700 and BSU35710 )</p>
      <p>GENE_LIST: BSU35700 BSU35710</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd15666_c"/>
    <speciesReference species="M_cpd15661_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00348_c"/>
    <speciesReference species="M_cpd15667_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10195" name="Teichoic acid export ATP-binding protein TagH (EC
3.6.3.40);Teichoic acid translocation permease protein TagG(BSU35710)">

```



```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: ( BSU35700 and BSU35710 )</p>
    <p>GENE_LIST: BSU35700 BSU35710</p>
    <p>SUBSYSTEM: Cell Wall and Capsule</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_cpd15662_c"/>
  <speciesReference species="M_cpd15666_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00348_c"/>
  <speciesReference species="M_cpd15669_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10196" name="Teichoic acid export ATP-binding protein TagH (EC
3.6.3.40);Teichoic acid translocation permease protein TagG(BSU35710)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU35700 and BSU35710 )</p>
      <p>GENE_LIST: BSU35700 BSU35710</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd15666_c"/>
    <speciesReference species="M_cpd15663_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00348_c"/>
    <speciesReference species="M_cpd15668_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10197" name="Minor teichoic acid biosynthesis protein GgaB;Minor
teichoic acid biosynthesis protein GgaA(BSU35690)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU35680 or BSU35690 )</p>
      <p>GENE_LIST: BSU35680 BSU35690</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00029_c" stoichiometry="30"/>
    <speciesReference species="M_C00203_c" stoichiometry="30"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00105_c" stoichiometry="30"/>
    <speciesReference species="M_C00015_c" stoichiometry="30"/>
    <speciesReference species="M_cpd11459_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10198" name="ATPase YjeE, predicted to have essential role in cell wall
biosynthesis">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

<p>GENE\_ASSOCIATION: BSU05910</p>  
 <p>GENE\_LIST: BSU05910</p>  
 <p>SUBSYSTEM: Cell Wall and Capsule</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_cpd15669\_c" stoichiometry="0.00808"/>  
 <speciesReference species="M\_cpd15665\_c" stoichiometry="0.453"/>  
 <speciesReference species="M\_cpd11459\_c" stoichiometry="0.0145"/>  
 <speciesReference species="M\_cpd15667\_c" stoichiometry="0.016"/>  
 <speciesReference species="M\_cpd15668\_c" stoichiometry="0.0112"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_cpd15666\_c" stoichiometry="0.48828"/>  
 <speciesReference species="M\_cpd15664\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_rxn10199" name="peptidoglycan biosynthesis;Cell division protein FtsI  
 [Peptidoglycan synthetase] (EC 2.4.1.129)[Transpeptidase, Penicillin binding protein  
 transpeptidase domain(BSU25000)]">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: ( BSU25000 or BSU16950 )</p>  
 <p>GENE\_LIST: BSU25000 BSU16950</p>  
 <p>SUBSYSTEM: Cell Wall and Capsule</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_cpd15666\_c"/>  
 <speciesReference species="M\_C05898\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C04574\_c"/>  
 <speciesReference species="M\_cpd15665\_c"/>

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10202" name="Phosphate:acyl-ACP acyltransferase
PlsX;Acyl-phosphate:glycerol-3-phosphate O-acyltransferase PlsY(BSU18070)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15890 and BSU18070 )</p>
      <p>GENE_LIST: BSU15890 BSU18070</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00093_c"/>
    <speciesReference species="M_C00154_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd15327_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10203" name="Phosphate:acyl-ACP acyltransferase
PlsX;Acyl-phosphate:glycerol-3-phosphate O-acyltransferase PlsY(BSU18070)"
reversible="false">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: ( BSU15890 and BSU18070 )</p>
    <p>GENE_LIST: BSU15890 BSU18070</p>
    <p>SUBSYSTEM: Fatty Acids and Lipids</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00093_c"/>
  <speciesReference species="M_C02593_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00010_c"/>
  <speciesReference species="M_cpd15331_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10204" name="Phosphate:acyl-ACP acyltransferase
PlsX;Acyl-phosphate:glycerol-3-phosphate O-acyltransferase PlsY(BSU18070)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15890 and BSU18070 )</p>
      <p>GENE_LIST: BSU15890 BSU18070</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00093_c"/>
    <speciesReference species="M_C00412_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd15329_c"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction      id="R_rxn10205"      name="Phosphate:acyl-ACP      acyltransferase
PlsX;Acyl-phosphate:glycerol-3-phosphate      O-acyltransferase      PlsY(BSU18070)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15890 and BSU18070 )</p>
      <p>GENE_LIST: BSU15890 BSU18070</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11432_c"/>
    <speciesReference species="M_C00093_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd15671_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction      id="R_rxn10206"      name="Phosphate:acyl-ACP      acyltransferase
PlsX;Acyl-phosphate:glycerol-3-phosphate      O-acyltransferase      PlsY(BSU18070)"
reversible="false">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: ( BSU15890 and BSU18070 )</p>
  <p>GENE_LIST: BSU15890 BSU18070</p>
  <p>SUBSYSTEM: Fatty Acids and Lipids</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_cpd11434_c"/>
  <speciesReference species="M_C00093_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_cpd15672_c"/>
  <speciesReference species="M_C00010_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10207" name="Phosphate:acyl-ACP acyltransferase
PlsX;Acyl-phosphate:glycerol-3-phosphate O-acyltransferase PlsY(BSU18070)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15890 and BSU18070 )</p>
      <p>GENE_LIST: BSU15890 BSU18070</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00093_c"/>
    <speciesReference species="M_cpd11435_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd15673_c"/>
  </listOfProducts>
  <kineticLaw>

```

```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction      id="R_rxn10208"      name="Phosphate:acyl-ACP      acyltransferase
PlsX;Acyl-phosphate:glycerol-3-phosphate      O-acyltransferase      PlsY(BSU18070)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15890 and BSU18070 )</p>
      <p>GENE_LIST: BSU15890 BSU18070</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00093_c"/>
    <speciesReference species="M_cpd11437_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd15674_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction      id="R_rxn10209"      name="Phosphate:acyl-ACP      acyltransferase
PlsX;Acyl-phosphate:glycerol-3-phosphate      O-acyltransferase      PlsY(BSU18070)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```



```

    <p>GENE_ASSOCIATION: ( BSU15890 and BSU18070 )</p>
    <p>GENE_LIST: BSU15890 BSU18070</p>
    <p>SUBSYSTEM: Fatty Acids and Lipids</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00093_c"/>
  <speciesReference species="M_cpd11439_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00010_c"/>
  <speciesReference species="M_cpd15675_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10210" name="Phosphate:acyl-ACP acyltransferase
PlsX;Acyl-phosphate:glycerol-3-phosphate O-acyltransferase PlsY(BSU18070)"
reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU15890 and BSU18070 )</p>
      <p>GENE_LIST: BSU15890 BSU18070</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00093_c"/>
    <speciesReference species="M_cpd11441_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd15676_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10211" name="1-acyl-sn-glycerol-3-phosphate acyltransferase (EC
2.3.1.51)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU09540</p>
      <p>GENE_LIST: BSU09540</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00154_c"/>
    <speciesReference species="M_cpd15327_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd15524_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10212" name="1-acyl-sn-glycerol-3-phosphate acyltransferase (EC
2.3.1.51)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU09540</p>
      <p>GENE_LIST: BSU09540</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>

```

```

    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C02593_c"/>
    <speciesReference species="M_cpd15331_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd15522_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10213" name="1-acyl-sn-glycerol-3-phosphate acyltransferase (EC
2.3.1.51)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU09540</p>
      <p>GENE_LIST: BSU09540</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00412_c"/>
    <speciesReference species="M_cpd15329_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd15526_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10214" name="1-acyl-sn-glycerol-3-phosphate acyltransferase (EC
2.3.1.51)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU09540</p>
      <p>GENE_LIST: BSU09540</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11432_c"/>
    <speciesReference species="M_cpd15671_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd15677_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10215" name="1-acyl-sn-glycerol-3-phosphate acyltransferase (EC
2.3.1.51)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU09540</p>
      <p>GENE_LIST: BSU09540</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11434_c"/>

```

```

    <speciesReference species="M_cpd15672_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd15678_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10216" name="1-acyl-sn-glycerol-3-phosphate acyltransferase (EC
2.3.1.51)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU09540</p>
      <p>GENE_LIST: BSU09540</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11435_c"/>
    <speciesReference species="M_cpd15673_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd15679_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_rxn10217" name="1-acyl-sn-glycerol-3-phosphate acyltransferase (EC
2.3.1.51)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU09540</p>
      <p>GENE_LIST: BSU09540</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11437_c"/>
    <speciesReference species="M_cpd15674_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd15680_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10218" name="1-acyl-sn-glycerol-3-phosphate acyltransferase (EC
2.3.1.51)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU09540</p>
      <p>GENE_LIST: BSU09540</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11439_c"/>
    <speciesReference species="M_cpd15675_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>

```

```

    <speciesReference species="M_cpd15681_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10219" name="1-acyl-sn-glycerol-3-phosphate acyltransferase (EC
2.3.1.51)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU09540</p>
      <p>GENE_LIST: BSU09540</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd11441_c"/>
    <speciesReference species="M_cpd15676_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00010_c"/>
    <speciesReference species="M_cpd15682_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10220" name="Phosphatidate cytidyltransferase (EC 2.7.7.41)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

```

    <p>GENE_ASSOCIATION: BSU16540</p>
    <p>GENE_LIST: BSU16540</p>
    <p>SUBSYSTEM: Fatty Acids and Lipids</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00063_c"/>
  <speciesReference species="M_cpd15677_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00013_c"/>
  <speciesReference species="M_cpd15683_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10221" name="Phosphatidate cytidyltransferase (EC 2.7.7.41)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16540</p>
      <p>GENE_LIST: BSU16540</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd15678_c"/>
    <speciesReference species="M_C00063_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_cpd15684_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```



```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10222" name="Phosphatidate cytidylyltransferase (EC 2.7.7.41)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16540</p>
      <p>GENE_LIST: BSU16540</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00063_c"/>
    <speciesReference species="M_cpd15679_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_cpd15685_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10223" name="Phosphatidate cytidylyltransferase (EC 2.7.7.41)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16540</p>
      <p>GENE_LIST: BSU16540</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00063_c"/>

```

```

    <speciesReference species="M_cpd15680_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_cpd15686_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10224" name="Phosphatidate cytidylyltransferase (EC 2.7.7.41)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16540</p>
      <p>GENE_LIST: BSU16540</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00063_c"/>
    <speciesReference species="M_cpd15681_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_cpd15687_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

<reaction id="R_rxn10225" name="Phosphatidate cytidyltransferase (EC 2.7.7.41)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16540</p>
      <p>GENE_LIST: BSU16540</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd15682_c"/>
    <speciesReference species="M_C00063_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_cpd15688_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

<reaction id="R_rxn10226" name="CDP-diacylglycerol--serine O-phosphatidyltransferase
(EC 2.7.8.8)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02270</p>
      <p>GENE_LIST: BSU02270</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00065_c"/>
    <speciesReference species="M_cpd15683_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00055_c"/>
    <speciesReference species="M_cpd15689_c"/>
  </listOfProducts>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10227" name="CDP-diacylglycerol--serine O-phosphatidyltransferase
(EC 2.7.8.8)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02270</p>
      <p>GENE_LIST: BSU02270</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00065_c"/>
    <speciesReference species="M_cpd15684_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00055_c"/>
    <speciesReference species="M_cpd15690_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10228" name="CDP-diacylglycerol--serine O-phosphatidyltransferase
(EC 2.7.8.8)" reversible="false">
  <notes>

```

```

<html xmlns="http://www.w3.org/1999/xhtml">
  <p>GENE_ASSOCIATION: BSU02270</p>
  <p>GENE_LIST: BSU02270</p>
  <p>SUBSYSTEM: Fatty Acids and Lipids</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00065_c"/>
  <speciesReference species="M_cpd15685_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00055_c"/>
  <speciesReference species="M_cpd15691_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10229" name="CDP-diacylglycerol--serine O-phosphatidyltransferase
(EC 2.7.8.8)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02270</p>
      <p>GENE_LIST: BSU02270</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00065_c"/>
    <speciesReference species="M_cpd15686_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00055_c"/>
    <speciesReference species="M_cpd15692_c"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10230" name="CDP-diacylglycerol--serine O-phosphatidyltransferase
(EC 2.7.8.8)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02270</p>
      <p>GENE_LIST: BSU02270</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00065_c"/>
    <speciesReference species="M_cpd15687_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00055_c"/>
    <speciesReference species="M_cpd15693_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10231" name="CDP-diacylglycerol--serine O-phosphatidyltransferase
(EC 2.7.8.8)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

```

    <p>GENE_ASSOCIATION: BSU02270</p>
    <p>GENE_LIST: BSU02270</p>
    <p>SUBSYSTEM: Fatty Acids and Lipids</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00065_c"/>
  <speciesReference species="M_cpd15688_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00055_c"/>
  <speciesReference species="M_cpd15694_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10232" name="Phosphatidylserine decarboxylase (EC 4.1.1.65)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02290</p>
      <p>GENE_LIST: BSU02290</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_cpd15689_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_cpd15695_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10233" name="Phosphatidylserine decarboxylase (EC 4.1.1.65)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02290</p>
      <p>GENE_LIST: BSU02290</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_cpd15690_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_cpd15696_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10234" name="Phosphatidylserine decarboxylase (EC 4.1.1.65)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02290</p>
      <p>GENE_LIST: BSU02290</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>

```



```

    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_cpd15691_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_cpd15697_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10235" name="Phosphatidylserine decarboxylase (EC 4.1.1.65)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02290</p>
      <p>GENE_LIST: BSU02290</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_cpd15692_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_cpd15698_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_rxn10236" name="Phosphatidylserine decarboxylase (EC 4.1.1.65)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02290</p>
      <p>GENE_LIST: BSU02290</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_cpd15693_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_cpd15699_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10237" name="Phosphatidylserine decarboxylase (EC 4.1.1.65)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU02290</p>
      <p>GENE_LIST: BSU02290</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_cpd15694_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00011_c"/>
    <speciesReference species="M_cpd15700_c"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10238" name="Diacylglycerol kinase (EC 2.7.1.107)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25310</p>
      <p>GENE_LIST: BSU25310</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd15677_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd15701_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10239" name="Diacylglycerol kinase (EC 2.7.1.107)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25310</p>
      <p>GENE_LIST: BSU25310</p>

```

```

    <p>SUBSYSTEM: Fatty Acids and Lipids</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_cpd15678_c"/>
  <speciesReference species="M_C00001_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_cpd15702_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10240" name="Diacylglycerol kinase (EC 2.7.1.107)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25310</p>
      <p>GENE_LIST: BSU25310</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd15679_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd15703_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10241" name="Diacylglycerol kinase (EC 2.7.1.107)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25310</p>
      <p>GENE_LIST: BSU25310</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd15680_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd15704_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10242" name="Diacylglycerol kinase (EC 2.7.1.107)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25310</p>
      <p>GENE_LIST: BSU25310</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd15681_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd15705_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10243" name="Diacylglycerol kinase (EC 2.7.1.107)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25310</p>
      <p>GENE_LIST: BSU25310</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd15682_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd15706_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10244" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c"/>
    <speciesReference species="M_cpd15728_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c"/>
    <speciesReference species="M_cpd15707_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10245" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c"/>
    <speciesReference species="M_cpd15729_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c"/>

```

```

    <speciesReference species="M_cpd15708_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10246" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c"/>
    <speciesReference species="M_cpd15730_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c"/>
    <speciesReference species="M_cpd15709_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10247" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>

```



```

    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Fatty Acids and Lipids</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00029_c"/>
  <speciesReference species="M_cpd15731_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00015_c"/>
  <speciesReference species="M_cpd15710_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10248" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c"/>
    <speciesReference species="M_cpd15732_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c"/>
    <speciesReference species="M_cpd15711_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10249" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c"/>
    <speciesReference species="M_cpd15733_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c"/>
    <speciesReference species="M_cpd15712_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10250" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c"/>
    <speciesReference species="M_cpd15734_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00015_c"/>
  <speciesReference species="M_cpd15713_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10251" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c"/>
    <speciesReference species="M_cpd15735_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c"/>
    <speciesReference species="M_cpd15714_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10252" name="">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Fatty Acids and Lipids</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00029_c"/>
  <speciesReference species="M_cpd15736_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00015_c"/>
  <speciesReference species="M_cpd15715_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10253" name="Diacylglycerol kinase (EC 2.7.1.107)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25310</p>
      <p>GENE_LIST: BSU25310</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_cpd15701_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_cpd15677_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10254" name="Diacylglycerol kinase (EC 2.7.1.107)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25310</p>
      <p>GENE_LIST: BSU25310</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_cpd15702_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_cpd15678_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10255" name="Diacylglycerol kinase (EC 2.7.1.107)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25310</p>
      <p>GENE_LIST: BSU25310</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_cpd15703_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_cpd15679_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10256" name="Diacylglycerol kinase (EC 2.7.1.107)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25310</p>
      <p>GENE_LIST: BSU25310</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_cpd15704_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_cpd15680_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

</kineticLaw>
</reaction>
<reaction id="R_rxn10257" name="Diacylglycerol kinase (EC 2.7.1.107)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25310</p>
      <p>GENE_LIST: BSU25310</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_cpd15705_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_cpd15681_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10258" name="Diacylglycerol kinase (EC 2.7.1.107)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU25310</p>
      <p>GENE_LIST: BSU25310</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_cpd15706_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_cpd15682_c"/>
  </listOfProducts>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10259" name="CDP-diacylglycerol--glycerol-3-phosphate
3-phosphatidyltransferase (EC 2.7.8.5)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16920</p>
      <p>GENE_LIST: BSU16920</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00093_c"/>
    <speciesReference species="M_cpd15683_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00055_c"/>
    <speciesReference species="M_cpd15716_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10260" name="CDP-diacylglycerol--glycerol-3-phosphate
3-phosphatidyltransferase (EC 2.7.8.5)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```



```

    <p>GENE_ASSOCIATION: BSU16920</p>
    <p>GENE_LIST: BSU16920</p>
    <p>SUBSYSTEM: Fatty Acids and Lipids</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_cpd15684_c"/>
  <speciesReference species="M_C00093_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00055_c"/>
  <speciesReference species="M_cpd15717_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10261" name="CDP-diacylglycerol--glycerol-3-phosphate
3-phosphatidyltransferase (EC 2.7.8.5)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16920</p>
      <p>GENE_LIST: BSU16920</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00093_c"/>
    <speciesReference species="M_cpd15685_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00055_c"/>
    <speciesReference species="M_cpd15718_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  </kineticLaw>

```

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction      id="R_rxn10262"      name="CDP-diacylglycerol--glycerol-3-phosphate
3-phosphatidyltransferase (EC 2.7.8.5)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16920</p>
      <p>GENE_LIST: BSU16920</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00093_c"/>
    <speciesReference species="M_cpd15686_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00055_c"/>
    <speciesReference species="M_cpd15719_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction      id="R_rxn10263"      name="CDP-diacylglycerol--glycerol-3-phosphate
3-phosphatidyltransferase (EC 2.7.8.5)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16920</p>
      <p>GENE_LIST: BSU16920</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00093_c"/>
  <speciesReference species="M_cpd15687_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00055_c"/>
  <speciesReference species="M_cpd15720_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction      id="R_rxn10264"      name="CDP-diacylglycerol--glycerol-3-phosphate
3-phosphatidyltransferase (EC 2.7.8.5)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU16920</p>
      <p>GENE_LIST: BSU16920</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00093_c"/>
    <speciesReference species="M_cpd15688_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00055_c"/>
    <speciesReference species="M_cpd15721_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10265" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd15716_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd15722_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10266" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd15717_c"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_cpd15723_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10267" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd15718_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd15724_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

<reaction id="R_rxn10268" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd15719_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd15725_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10269" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd15720_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd15726_c"/>
  </listOfProducts>

```

```

</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10270" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_cpd15721_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd15727_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10271" name="diglucosyldiacylglycerol synthase (LTA membrane anchor
synthesis)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

<p>GENE\_ASSOCIATION: BSU21920</p>  
 <p>GENE\_LIST: BSU21920</p>  
 <p>SUBSYSTEM: Cell Wall and Capsule</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00029\_c"/>  
 <speciesReference species="M\_cpd15737\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00015\_c"/>  
 <speciesReference species="M\_cpd15728\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_rxn10272" name="diglucosyldiacylglycerol synthase (LTA membrane anchor synthesis)">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: BSU21920</p>  
 <p>GENE\_LIST: BSU21920</p>  
 <p>SUBSYSTEM: Cell Wall and Capsule</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00029\_c"/>  
 <speciesReference species="M\_cpd15738\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00015\_c"/>  
 <speciesReference species="M\_cpd15729\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>



```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10273" name="diglucosyldiacylglycerol synthase (LTA membrane anchor
synthesis)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU21920</p>
      <p>GENE_LIST: BSU21920</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c"/>
    <speciesReference species="M_cpd15739_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c"/>
    <speciesReference species="M_cpd15730_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10274" name="diglucosyldiacylglycerol synthase (LTA membrane anchor
synthesis)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU21920</p>
      <p>GENE_LIST: BSU21920</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_C00029_c"/>
  <speciesReference species="M_cpd15740_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00015_c"/>
  <speciesReference species="M_cpd15731_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10275" name="diglucosyldiacylglycerol synthase (LTA membrane anchor
synthesis)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU21920</p>
      <p>GENE_LIST: BSU21920</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c"/>
    <speciesReference species="M_cpd15741_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c"/>
    <speciesReference species="M_cpd15732_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10276" name="diglucosyldiacylglycerol synthase (LTA membrane anchor
synthesis)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU21920</p>
      <p>GENE_LIST: BSU21920</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c"/>
    <speciesReference species="M_cpd15742_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c"/>
    <speciesReference species="M_cpd15733_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10277" name="diglucosyldiacylglycerol synthase (LTA membrane anchor
synthesis)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU21920</p>
      <p>GENE_LIST: BSU21920</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c"/>
    <speciesReference species="M_cpd15743_c"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00015_c"/>
  <speciesReference species="M_cpd15734_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10278" name="diglucosyldiacylglycerol synthase (LTA membrane anchor
synthesis)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU21920</p>
      <p>GENE_LIST: BSU21920</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c"/>
    <speciesReference species="M_cpd15744_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c"/>
    <speciesReference species="M_cpd15735_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

<reaction id="R\_rxn10279" name="diglucosyldiacylglycerol synthase (LTA membrane anchor synthesis)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU21920</p>

<p>GENE\_LIST: BSU21920</p>

<p>SUBSYSTEM: Cell Wall and Capsule</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00029\_c"/>

<speciesReference species="M\_cpd15745\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00015\_c"/>

<speciesReference species="M\_cpd15736\_c"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn10280" name="1,2-diacylglycerol 3-glucosyltransferase (EC 2.4.1.157)">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: BSU13350</p>

<p>GENE\_LIST: BSU13350</p>

<p>SUBSYSTEM: Fatty Acids and Lipids</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00029\_c"/>

<speciesReference species="M\_cpd15309\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00015\_c"/>

<speciesReference species="M\_cpd15737\_c"/>

</listOfProducts>

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10281" name="1,2-diacylglycerol 3-glucosyltransferase (EC 2.4.1.157)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13350</p>
      <p>GENE_LIST: BSU13350</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c"/>
    <speciesReference species="M_cpd15307_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c"/>
    <speciesReference species="M_cpd15738_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10282" name="1,2-diacylglycerol 3-glucosyltransferase (EC 2.4.1.157)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13350</p>
      <p>GENE_LIST: BSU13350</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>

```

```

</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00029_c"/>
  <speciesReference species="M_cpd15311_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00015_c"/>
  <speciesReference species="M_cpd15739_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10283" name="1,2-diacylglycerol 3-glucosyltransferase (EC 2.4.1.157)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13350</p>
      <p>GENE_LIST: BSU13350</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c"/>
    <speciesReference species="M_cpd15701_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c"/>
    <speciesReference species="M_cpd15740_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10284" name="1,2-diacylglycerol 3-glucosyltransferase (EC 2.4.1.157)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13350</p>
      <p>GENE_LIST: BSU13350</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c"/>
    <speciesReference species="M_cpd15702_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c"/>
    <speciesReference species="M_cpd15741_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10285" name="1,2-diacylglycerol 3-glucosyltransferase (EC 2.4.1.157)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13350</p>
      <p>GENE_LIST: BSU13350</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c"/>
    <speciesReference species="M_cpd15703_c"/>
  </listOfReactants>
  <listOfProducts>

```



```

    <speciesReference species="M_C00015_c"/>
    <speciesReference species="M_cpd15742_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10286" name="1,2-diacylglycerol 3-glucosyltransferase (EC 2.4.1.157)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13350</p>
      <p>GENE_LIST: BSU13350</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c"/>
    <speciesReference species="M_cpd15704_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c"/>
    <speciesReference species="M_cpd15743_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10287" name="1,2-diacylglycerol 3-glucosyltransferase (EC 2.4.1.157)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

```

    <p>GENE_ASSOCIATION: BSU13350</p>
    <p>GENE_LIST: BSU13350</p>
    <p>SUBSYSTEM: Fatty Acids and Lipids</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00029_c"/>
  <speciesReference species="M_cpd15705_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00015_c"/>
  <speciesReference species="M_cpd15744_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10288" name="1,2-diacylglycerol 3-glucosyltransferase (EC 2.4.1.157)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU13350</p>
      <p>GENE_LIST: BSU13350</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c"/>
    <speciesReference species="M_cpd15706_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c"/>
    <speciesReference species="M_cpd15745_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction          id="R_rxn10289"          name="CDP-glycerol:poly(glycerophosphate)
glycerophosphotransferase (EC 2.7.8.12)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35720</p>
      <p>GENE_LIST: BSU35720</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00513_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15728_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00055_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15746_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction          id="R_rxn10290"          name="CDP-glycerol:poly(glycerophosphate)
glycerophosphotransferase (EC 2.7.8.12)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35720</p>
      <p>GENE_LIST: BSU35720</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00513_c" stoichiometry="24"/>
  <speciesReference species="M_cpd15729_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00055_c" stoichiometry="24"/>
  <speciesReference species="M_cpd15747_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10291" name="CDP-glycerol:poly(glycerophosphate)
glycerophosphotransferase (EC 2.7.8.12)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35720</p>
      <p>GENE_LIST: BSU35720</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00513_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15730_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_cpd15748_c"/>
    <speciesReference species="M_C00055_c" stoichiometry="24"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction          id="R_rxn10292"          name="CDP-glycerol:poly(glycerophosphate)
glycerophosphotransferase (EC 2.7.8.12)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35720</p>
      <p>GENE_LIST: BSU35720</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00513_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15731_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00055_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15749_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction          id="R_rxn10293"          name="CDP-glycerol:poly(glycerophosphate)
glycerophosphotransferase (EC 2.7.8.12)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35720</p>
      <p>GENE_LIST: BSU35720</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00513_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15732_c"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00055_c" stoichiometry="24"/>
  <speciesReference species="M_cpd15750_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10294" name="CDP-glycerol:poly(glycerophosphate)
glycerophosphotransferase (EC 2.7.8.12)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35720</p>
      <p>GENE_LIST: BSU35720</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00513_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15733_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00055_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15751_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10295" name="CDP-glycerol:poly(glycerophosphate)

```

glycerophosphotransferase (EC 2.7.8.12)">

```
<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: BSU35720</p>
    <p>GENE_LIST: BSU35720</p>
    <p>SUBSYSTEM: Cell Wall and Capsule</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00513_c" stoichiometry="24"/>
  <speciesReference species="M_cpd15734_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00055_c" stoichiometry="24"/>
  <speciesReference species="M_cpd15752_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction          id="R_rxn10296"          name="CDP-glycerol:poly(glycerophosphate)
```

glycerophosphotransferase (EC 2.7.8.12)">

```
<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: BSU35720</p>
    <p>GENE_LIST: BSU35720</p>
    <p>SUBSYSTEM: Cell Wall and Capsule</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00513_c" stoichiometry="24"/>
  <speciesReference species="M_cpd15735_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00055_c" stoichiometry="24"/>
  <speciesReference species="M_cpd15753_c"/>
</listOfProducts>
```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10297" name="CDP-glycerol:poly(glycerophosphate)
glycerophosphotransferase (EC 2.7.8.12)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35720</p>
      <p>GENE_LIST: BSU35720</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd15736_c"/>
    <speciesReference species="M_C00513_c" stoichiometry="24"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00055_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15754_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10298" name="Poly(glycerol-phosphate) alpha-glucosyltransferase (EC
2.4.1.52)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35730</p>

```



<p>GENE\_LIST: BSU35730</p>  
 <p>SUBSYSTEM: Cell Wall and Capsule</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00029\_c" stoichiometry="24"/>  
 <speciesReference species="M\_cpd15746\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00015\_c" stoichiometry="24"/>  
 <speciesReference species="M\_cpd15755\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_rxn10299" name="Poly(glycerol-phosphate) alpha-glucosyltransferase (EC 2.4.1.52)">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: BSU35730</p>  
 <p>GENE\_LIST: BSU35730</p>  
 <p>SUBSYSTEM: Cell Wall and Capsule</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00029\_c" stoichiometry="24"/>  
 <speciesReference species="M\_cpd15747\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00015\_c" stoichiometry="24"/>  
 <speciesReference species="M\_cpd15756\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>

```

    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10300" name="Poly(glycerol-phosphate) alpha-glucosyltransferase (EC
2.4.1.52)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35730</p>
      <p>GENE_LIST: BSU35730</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd15748_c"/>
    <speciesReference species="M_C00029_c" stoichiometry="24"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15757_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10301" name="Poly(glycerol-phosphate) alpha-glucosyltransferase (EC
2.4.1.52)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35730</p>
      <p>GENE_LIST: BSU35730</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00029_c" stoichiometry="24"/>
  <speciesReference species="M_cpd15749_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00015_c" stoichiometry="24"/>
  <speciesReference species="M_cpd15758_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10302" name="Poly(glycerol-phosphate) alpha-glucosyltransferase (EC
2.4.1.52)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35730</p>
      <p>GENE_LIST: BSU35730</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15750_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15759_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10303" name="Poly(glycerol-phosphate) alpha-glucosyltransferase (EC
2.4.1.52)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35730</p>
      <p>GENE_LIST: BSU35730</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15751_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15760_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10304" name="Poly(glycerol-phosphate) alpha-glucosyltransferase (EC
2.4.1.52)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35730</p>
      <p>GENE_LIST: BSU35730</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15752_c"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00015_c" stoichiometry="24"/>
  <speciesReference species="M_cpd15761_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10305" name="Poly(glycerol-phosphate) alpha-glucosyltransferase (EC
2.4.1.52)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35730</p>
      <p>GENE_LIST: BSU35730</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00029_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15753_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15762_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10306" name="Poly(glycerol-phosphate) alpha-glucosyltransferase (EC

```

2.4.1.52)">

```
<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: BSU35730</p>
    <p>GENE_LIST: BSU35730</p>
    <p>SUBSYSTEM: Cell Wall and Capsule</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00029_c" stoichiometry="24"/>
  <speciesReference species="M_cpd15754_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00015_c" stoichiometry="24"/>
  <speciesReference species="M_cpd15763_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10307" name="Undecaprenyl-phosphate N-acetylglucosaminyl
1-phosphate transferase (EC 2.7.8.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35530</p>
      <p>GENE_LIST: BSU35530</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00043_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15746_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15764_c"/>
  </listOfProducts>
```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10308" name="Undecaprenyl-phosphate N-acetylglucosaminyl
1-phosphate transferase (EC 2.7.8.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35530</p>
      <p>GENE_LIST: BSU35530</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00043_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15747_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15765_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10309" name="Undecaprenyl-phosphate N-acetylglucosaminyl
1-phosphate transferase (EC 2.7.8.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35530</p>

```

<p>GENE\_LIST: BSU35530</p>  
 <p>SUBSYSTEM: Cell Wall and Capsule</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_cpd15748\_c"/>  
 <speciesReference species="M\_C00043\_c" stoichiometry="24"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00015\_c" stoichiometry="24"/>  
 <speciesReference species="M\_cpd15766\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>  
 <listOfParameters>  
 <parameter id="LOWER\_BOUND" value="-1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>  
 <parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>  
 </listOfParameters>  
 </kineticLaw>  
 </reaction>  
 <reaction id="R\_rxn10310" name="Undecaprenyl-phosphate N-acetylglucosaminyl  
 1-phosphate transferase (EC 2.7.8.-)">  
 <notes>  
 <html xmlns="http://www.w3.org/1999/xhtml">  
 <p>GENE\_ASSOCIATION: BSU35530</p>  
 <p>GENE\_LIST: BSU35530</p>  
 <p>SUBSYSTEM: Cell Wall and Capsule</p>  
 </html>  
 </notes>  
 <listOfReactants>  
 <speciesReference species="M\_C00043\_c" stoichiometry="24"/>  
 <speciesReference species="M\_cpd15749\_c"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_C00015\_c" stoichiometry="24"/>  
 <speciesReference species="M\_cpd15767\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>



```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10311" name="Undecaprenyl-phosphate N-acetylglucosaminyl
1-phosphate transferase (EC 2.7.8.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35530</p>
      <p>GENE_LIST: BSU35530</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00043_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15750_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15768_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10312" name="Undecaprenyl-phosphate N-acetylglucosaminyl
1-phosphate transferase (EC 2.7.8.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35530</p>
      <p>GENE_LIST: BSU35530</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00043_c" stoichiometry="24"/>
  <speciesReference species="M_cpd15751_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00015_c" stoichiometry="24"/>
  <speciesReference species="M_cpd15769_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10313" name="Undecaprenyl-phosphate N-acetylglucosaminyl
1-phosphate transferase (EC 2.7.8.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35530</p>
      <p>GENE_LIST: BSU35530</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00043_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15752_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15770_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10314" name="Undecaprenyl-phosphate N-acetylglucosaminyl
1-phosphate transferase (EC 2.7.8.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35530</p>
      <p>GENE_LIST: BSU35530</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00043_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15753_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00015_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15771_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10315" name="Undecaprenyl-phosphate N-acetylglucosaminyl
1-phosphate transferase (EC 2.7.8.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35530</p>
      <p>GENE_LIST: BSU35530</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00043_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15754_c"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00015_c" stoichiometry="24"/>
  <speciesReference species="M_cpd15772_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10316" name="Cell envelope-associated transcriptional attenuator
LytR-CpsA-Psr, subfamily F2 (as in PMID19099556)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35520</p>
      <p>GENE_LIST: BSU35520</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c" stoichiometry="24"/>
    <speciesReference species="M_C00133_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15746_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c" stoichiometry="24"/>
    <speciesReference species="M_C00020_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15773_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_rxn10317" name="Cell envelope-associated transcriptional attenuator
LytR-CpsA-Psr, subfamily F2 (as in PMID19099556)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35520</p>
      <p>GENE_LIST: BSU35520</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c" stoichiometry="24"/>
    <speciesReference species="M_C00133_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15747_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00013_c" stoichiometry="24"/>
    <speciesReference species="M_C00020_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15774_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10318" name="Cell envelope-associated transcriptional attenuator
LytR-CpsA-Psr, subfamily F2 (as in PMID19099556)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35520</p>
      <p>GENE_LIST: BSU35520</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c" stoichiometry="24"/>
    <speciesReference species="M_C00133_c" stoichiometry="24"/>

```

```

    <speciesReference species="M_cpd15748_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c" stoichiometry="24"/>
    <speciesReference species="M_C00020_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15775_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10319" name="Cell envelope-associated transcriptional attenuator
LytR-CpsA-Psr, subfamily F2 (as in PMID19099556)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35520</p>
      <p>GENE_LIST: BSU35520</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c" stoichiometry="24"/>
    <speciesReference species="M_C00133_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15749_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c" stoichiometry="24"/>
    <speciesReference species="M_C00020_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15776_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>

```

```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10320" name="Cell envelope-associated transcriptional attenuator
LytR-CpsA-Psr, subfamily F2 (as in PMID19099556)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35520</p>
      <p>GENE_LIST: BSU35520</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c" stoichiometry="24"/>
    <speciesReference species="M_C00133_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15750_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c" stoichiometry="24"/>
    <speciesReference species="M_C00020_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15777_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10321" name="Cell envelope-associated transcriptional attenuator
LytR-CpsA-Psr, subfamily F2 (as in PMID19099556)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35520</p>
      <p>GENE_LIST: BSU35520</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00002_c" stoichiometry="24"/>
    <speciesReference species="M_C00133_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15751_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c" stoichiometry="24"/>
    <speciesReference species="M_C00020_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15778_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10322" name="Cell envelope-associated transcriptional attenuator
LytR-CpsA-Psr, subfamily F2 (as in PMID19099556)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35520</p>
      <p>GENE_LIST: BSU35520</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c" stoichiometry="24"/>
    <speciesReference species="M_C00133_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15752_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c" stoichiometry="24"/>
    <speciesReference species="M_C00020_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15779_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```



```

    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10323" name="Cell envelope-associated transcriptional attenuator
LytR-CpsA-Psr, subfamily F2 (as in PMID19099556)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35520</p>
      <p>GENE_LIST: BSU35520</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c" stoichiometry="24"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00133_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15753_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c" stoichiometry="24"/>
    <speciesReference species="M_C00020_c" stoichiometry="24"/>
    <speciesReference species="M_cpd15780_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10324" name="Cell envelope-associated transcriptional attenuator
LytR-CpsA-Psr, subfamily F2 (as in PMID19099556)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU35520</p>
      <p>GENE_LIST: BSU35520</p>
      <p>SUBSYSTEM: Cell Wall and Capsule</p>

```

```

</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c" stoichiometry="24"/>
  <speciesReference species="M_C00133_c" stoichiometry="24"/>
  <speciesReference species="M_cpd15754_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00013_c" stoichiometry="24"/>
  <speciesReference species="M_C00020_c" stoichiometry="24"/>
  <speciesReference species="M_cpd15781_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10325" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00047_c"/>
    <speciesReference species="M_cpd15538_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_cpd15782_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10326" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00047_c"/>
    <speciesReference species="M_cpd15536_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_cpd15783_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10327" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>

```

```

    <p>SUBSYSTEM: Fatty Acids and Lipids</p>
</html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00047_c"/>
  <speciesReference species="M_cpd15540_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00013_c"/>
  <speciesReference species="M_C00020_c"/>
  <speciesReference species="M_cpd15784_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10328" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00047_c"/>
    <speciesReference species="M_cpd15722_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_cpd15785_c"/>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10329" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00047_c"/>
    <speciesReference species="M_cpd15723_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_cpd15786_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10330" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

```

    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Fatty Acids and Lipids</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00047_c"/>
  <speciesReference species="M_cpd15724_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00013_c"/>
  <speciesReference species="M_C00020_c"/>
  <speciesReference species="M_cpd15787_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10331" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00047_c"/>
    <speciesReference species="M_cpd15725_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>

```

```

    <speciesReference species="M_cpd15788_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10332" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00047_c"/>
    <speciesReference species="M_cpd15726_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00013_c"/>
    <speciesReference species="M_C00020_c"/>
    <speciesReference species="M_cpd15789_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10333" name="" reversible="false">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Fatty Acids and Lipids</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00002_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00047_c"/>
  <speciesReference species="M_cpd15727_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00013_c"/>
  <speciesReference species="M_C00020_c"/>
  <speciesReference species="M_cpd15790_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10334" name="Cardiolipin synthetase (EC 2.7.8.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU36590 or BSU37240 )</p>
      <p>GENE_LIST: BSU36590 BSU37240</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd15538_c" stoichiometry="2"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00116_c"/>
    <speciesReference species="M_cpd15791_c"/>
  </listOfProducts>

```



```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10335" name="Cardiolipin synthetase (EC 2.7.8.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU36590 or BSU37240 )</p>
      <p>GENE_LIST: BSU36590 BSU37240</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd15536_c" stoichiometry="2"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00116_c"/>
    <speciesReference species="M_cpd15792_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10336" name="Cardiolipin synthetase (EC 2.7.8.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU36590 or BSU37240 )</p>
      <p>GENE_LIST: BSU36590 BSU37240</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_cpd15540_c" stoichiometry="2"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00116_c"/>
  <speciesReference species="M_cpd15793_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10337" name="Cardiolipin synthetase (EC 2.7.8.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU36590 or BSU37240 )</p>
      <p>GENE_LIST: BSU36590 BSU37240</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd15722_c" stoichiometry="2"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00116_c"/>
    <speciesReference species="M_cpd15794_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>

```

```

</reaction>
<reaction id="R_rxn10338" name="Cardiolipin synthetase (EC 2.7.8.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU36590 or BSU37240 )</p>
      <p>GENE_LIST: BSU36590 BSU37240</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd15723_c" stoichiometry="2"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00116_c"/>
    <speciesReference species="M_cpd15795_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10339" name="Cardiolipin synthetase (EC 2.7.8.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU36590 or BSU37240 )</p>
      <p>GENE_LIST: BSU36590 BSU37240</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd15724_c" stoichiometry="2"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00116_c"/>
    <speciesReference species="M_cpd15796_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10340" name="Cardiolipin synthetase (EC 2.7.8.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU36590 or BSU37240 )</p>
      <p>GENE_LIST: BSU36590 BSU37240</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd15725_c" stoichiometry="2"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00116_c"/>
    <speciesReference species="M_cpd15797_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10341" name="Cardiolipin synthetase (EC 2.7.8.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU36590 or BSU37240 )</p>
      <p>GENE_LIST: BSU36590 BSU37240</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_cpd15726_c" stoichiometry="2"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00116_c"/>
    <speciesReference species="M_cpd15798_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10342" name="Cardiolipin synthetase (EC 2.7.8.-)">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU36590 or BSU37240 )</p>
      <p>GENE_LIST: BSU36590 BSU37240</p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd15727_c" stoichiometry="2"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00116_c"/>
    <speciesReference species="M_cpd15799_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10343" name="Copper-translocating P-type ATPase (EC 3.6.3.4)|Lead,

```

cadmium, zinc and mercury transporting ATPase (EC 3.6.3.3) (EC 3.6.3.5)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU33490 or BSU13850 )</p>

<p>GENE\_LIST: BSU33490 BSU13850</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00002\_c"/>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_C00703\_c"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00008\_c"/>

<speciesReference species="M\_C00009\_c"/>

<speciesReference species="M\_C00080\_c"/>

<speciesReference species="M\_C00703\_e"/>

</listOfProducts>

<kineticLaw>

<math xmlns="http://www.w3.org/1998/Math/MathML">

<ci> FLUX\_VALUE </ci>

</math>

<listOfParameters>

<parameter id="LOWER\_BOUND" value="0" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="UPPER\_BOUND" value="1000" units="mmol\_per\_gDW\_per\_hr"/>

<parameter id="OBJECTIVE\_COEFFICIENT" value="0"/>

</listOfParameters>

</kineticLaw>

</reaction>

<reaction id="R\_rxn10344" name="Copper-translocating P-type ATPase (EC 3.6.3.4)|Lead, cadmium, zinc and mercury transporting ATPase (EC 3.6.3.3) (EC 3.6.3.5)" reversible="false">

<notes>

<html xmlns="http://www.w3.org/1999/xhtml">

<p>GENE\_ASSOCIATION: ( BSU33490 or BSU13850 )</p>

<p>GENE\_LIST: BSU33490 BSU13850</p>

<p>SUBSYSTEM: Membrane Transport</p>

</html>

</notes>

<listOfReactants>

<speciesReference species="M\_C00002\_c"/>

<speciesReference species="M\_C00001\_c"/>

<speciesReference species="M\_C06696\_c"/>

</listOfReactants>

```

</listOfProducts>
  <speciesReference species="M_C00008_c"/>
  <speciesReference species="M_C00009_c"/>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C06696_e"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10474" name="Magnesium and cobalt transport protein CorA;Magnesium
and cobalt transport protein corA(BSU24740)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU08000 or BSU24740 )</p>
      <p>GENE_LIST: BSU08000 BSU24740</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00175_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00175_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10537" name="Na(+)-linked D-alanine glycine permease">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: BSU07750</p>
    <p>GENE_LIST: BSU07750</p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C01330_e"/>
  <speciesReference species="M_C00037_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C01330_c"/>
  <speciesReference species="M_C00037_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10541" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00283_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00283_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```



```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10862" name="Glycine betaine ABC transport system, ATP-binding
protein OpuAA (EC 3.6.3.32);Glycine betaine ABC transport system, permease protein
OpuAB(BSU02990);Glycine betaine ABC transport system, glycine betaine-binding protein
OpuAC(BSU03000)" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU02980 and BSU02990 and BSU03000 )</p>
      <p>GENE_LIST: BSU02980 BSU02990 BSU03000</p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c"/>
    <speciesReference species="M_C00001_c"/>
    <speciesReference species="M_C00037_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00008_c"/>
    <speciesReference species="M_C00009_c"/>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00037_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn11395" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>

```

```

    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e" stoichiometry="2"/>
  <speciesReference species="M_C00013_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c" stoichiometry="2"/>
  <speciesReference species="M_C00013_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn11397" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_cpd15585_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_cpd15585_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>

```

```

    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn11398" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e" stoichiometry="2"/>
    <speciesReference species="M_C00552_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00552_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn11399" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C01040_e"/>

```

```

</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C01040_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn11400" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C02353_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C02353_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn11401" name="">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C02354_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C02354_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn11402" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C02355_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C02355_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn11403" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C03031_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C03031_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn11404" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>

```

```

<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C03619_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C03619_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn11405" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C05332_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C05332_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

<reaction id="R_rxn11407" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C12147_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C12147_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn11408" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e"/>
    <speciesReference species="M_C00601_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00601_c"/>
  </listOfProducts>
  <kineticLaw>

```



```

<math xmlns="http://www.w3.org/1998/Math/MathML">
  <ci> FLUX_VALUE </ci>
</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn12519" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00080_e" stoichiometry="2"/>
    <speciesReference species="M_C00169_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c" stoichiometry="2"/>
    <speciesReference species="M_C00169_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_rxn10200" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_cpd15748_c" stoichiometry="0.001761"/>
  <speciesReference species="M_cpd15775_c" stoichiometry="0.002339"/>
  <speciesReference species="M_cpd15752_c" stoichiometry="0.009356"/>
  <speciesReference species="M_cpd15761_c" stoichiometry="0.00435"/>
  <speciesReference species="M_cpd15779_c" stoichiometry="0.01236"/>
  <speciesReference species="M_cpd15746_c" stoichiometry="0.004866"/>
  <speciesReference species="M_cpd15773_c" stoichiometry="0.006441"/>
  <speciesReference species="M_cpd15747_c" stoichiometry="0.001122"/>
  <speciesReference species="M_cpd15756_c" stoichiometry="0.0005201"/>
  <speciesReference species="M_cpd15754_c" stoichiometry="0.002264"/>
  <speciesReference species="M_cpd15781_c" stoichiometry="0.002997"/>
  <speciesReference species="M_cpd15750_c" stoichiometry="0.008667"/>
  <speciesReference species="M_cpd15749_c" stoichiometry="0.003687"/>
  <speciesReference species="M_cpd15777_c" stoichiometry="0.01149"/>
  <speciesReference species="M_cpd15757_c" stoichiometry="0.0008257"/>
  <speciesReference species="M_cpd15764_c" stoichiometry="0.002032"/>
  <speciesReference species="M_cpd15765_c" stoichiometry="0.0004655"/>
  <speciesReference species="M_cpd15759_c" stoichiometry="0.004053"/>
  <speciesReference species="M_cpd15768_c" stoichiometry="0.003631"/>
  <speciesReference species="M_cpd15753_c" stoichiometry="0.01585"/>
  <speciesReference species="M_cpd15751_c" stoichiometry="0.0005365"/>
  <speciesReference species="M_cpd15769_c" stoichiometry="0.0002227"/>
  <speciesReference species="M_cpd15762_c" stoichiometry="0.00737"/>
  <speciesReference species="M_cpd15767_c" stoichiometry="0.001545"/>
  <speciesReference species="M_cpd15776_c" stoichiometry="0.004889"/>
  <speciesReference species="M_cpd15755_c" stoichiometry="0.002269"/>
  <speciesReference species="M_cpd15758_c" stoichiometry="0.001724"/>
  <speciesReference species="M_cpd15760_c" stoichiometry="0.0002488"/>
  <speciesReference species="M_cpd15763_c" stoichiometry="0.001056"/>
  <speciesReference species="M_cpd15766_c" stoichiometry="0.0007401"/>
  <speciesReference species="M_cpd15770_c" stoichiometry="0.003895"/>
  <speciesReference species="M_cpd15771_c" stoichiometry="0.006599"/>
  <speciesReference species="M_cpd15772_c" stoichiometry="0.0009457"/>
  <speciesReference species="M_cpd15774_c" stoichiometry="0.00148"/>
  <speciesReference species="M_cpd15778_c" stoichiometry="0.0007078"/>
  <speciesReference species="M_cpd15780_c" stoichiometry="0.02094"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_cpd15670_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">

```

```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn10201" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd15736_c" stoichiometry="0.006735"/>
    <speciesReference species="M_cpd15715_c" stoichiometry="0.004053"/>
    <speciesReference species="M_cpd15734_c" stoichiometry="0.02855"/>
    <speciesReference species="M_cpd15740_c" stoichiometry="0.008216"/>
    <speciesReference species="M_cpd15696_c" stoichiometry="0.1262"/>
    <speciesReference species="M_cpd15538_c" stoichiometry="0.02308"/>
    <speciesReference species="M_cpd15743_c" stoichiometry="0.02224"/>
    <speciesReference species="M_cpd15727_c" stoichiometry="0.01074"/>
    <speciesReference species="M_cpd15799_c" stoichiometry="0.0002781"/>
    <speciesReference species="M_cpd15529_c" stoichiometry="0.01816"/>
    <speciesReference species="M_cpd15531_c" stoichiometry="0.07327"/>
    <speciesReference species="M_cpd15533_c" stoichiometry="0.02483"/>
    <speciesReference species="M_cpd15536_c" stoichiometry="0.005699"/>
    <speciesReference species="M_cpd15540_c" stoichiometry="0.007846"/>
    <speciesReference species="M_cpd15695_c" stoichiometry="0.05369"/>
    <speciesReference species="M_cpd15697_c" stoichiometry="0.008684"/>
    <speciesReference species="M_cpd15698_c" stoichiometry="0.1459"/>
    <speciesReference species="M_cpd15699_c" stoichiometry="0.2473"/>
    <speciesReference species="M_cpd15700_c" stoichiometry="0.0341"/>
    <speciesReference species="M_cpd15707_c" stoichiometry="0.008709"/>
    <speciesReference species="M_cpd15708_c" stoichiometry="0.002095"/>
    <speciesReference species="M_cpd15709_c" stoichiometry="0.003029"/>
    <speciesReference species="M_cpd15710_c" stoichiometry="0.006468"/>
    <speciesReference species="M_cpd15711_c" stoichiometry="0.0152"/>
    <speciesReference species="M_cpd15712_c" stoichiometry="0.001002"/>
    <speciesReference species="M_cpd15713_c" stoichiometry="0.0171"/>
  </listOfReactants>

```

<speciesReference species="M\_cpd15714\_c" stoichiometry="0.02897"/>  
 <speciesReference species="M\_cpd15722\_c" stoichiometry="0.01694"/>  
 <speciesReference species="M\_cpd15723\_c" stoichiometry="0.03982"/>  
 <speciesReference species="M\_cpd15724\_c" stoichiometry="0.002726"/>  
 <speciesReference species="M\_cpd15725\_c" stoichiometry="0.04589"/>  
 <speciesReference species="M\_cpd15726\_c" stoichiometry="0.07776"/>  
 <speciesReference species="M\_cpd15728\_c" stoichiometry="0.01447"/>  
 <speciesReference species="M\_cpd15729\_c" stoichiometry="0.003517"/>  
 <speciesReference species="M\_cpd15730\_c" stoichiometry="0.004989"/>  
 <speciesReference species="M\_cpd15731\_c" stoichiometry="0.0107"/>  
 <speciesReference species="M\_cpd15732\_c" stoichiometry="0.02515"/>  
 <speciesReference species="M\_cpd15733\_c" stoichiometry="0.001682"/>  
 <speciesReference species="M\_cpd15735\_c" stoichiometry="0.04838"/>  
 <speciesReference species="M\_cpd15737\_c" stoichiometry="0.01119"/>  
 <speciesReference species="M\_cpd15738\_c" stoichiometry="0.00276"/>  
 <speciesReference species="M\_cpd15739\_c" stoichiometry="0.003807"/>  
 <speciesReference species="M\_cpd15741\_c" stoichiometry="0.01931"/>  
 <speciesReference species="M\_cpd15742\_c" stoichiometry="0.00132"/>  
 <speciesReference species="M\_cpd15744\_c" stoichiometry="0.03768"/>  
 <speciesReference species="M\_cpd15745\_c" stoichiometry="0.005208"/>  
 <speciesReference species="M\_cpd15782\_c" stoichiometry="0.002845"/>  
 <speciesReference species="M\_cpd15783\_c" stoichiometry="0.0006934"/>  
 <speciesReference species="M\_cpd15784\_c" stoichiometry="0.0009777"/>  
 <speciesReference species="M\_cpd15785\_c" stoichiometry="0.0021"/>  
 <speciesReference species="M\_cpd15786\_c" stoichiometry="0.004935"/>  
 <speciesReference species="M\_cpd15787\_c" stoichiometry="0.0003316"/>  
 <speciesReference species="M\_cpd15788\_c" stoichiometry="0.005621"/>  
 <speciesReference species="M\_cpd15789\_c" stoichiometry="0.009523"/>  
 <speciesReference species="M\_cpd15790\_c" stoichiometry="0.001324"/>  
 <speciesReference species="M\_cpd15791\_c" stoichiometry="0.0005977"/>  
 <speciesReference species="M\_cpd15792\_c" stoichiometry="0.0001484"/>  
 <speciesReference species="M\_cpd15793\_c" stoichiometry="0.0002022"/>  
 <speciesReference species="M\_cpd15794\_c" stoichiometry="0.0004375"/>  
 <speciesReference species="M\_cpd15795\_c" stoichiometry="0.001028"/>  
 <speciesReference species="M\_cpd15797\_c" stoichiometry="0.001192"/>  
 <speciesReference species="M\_cpd15798\_c" stoichiometry="0.002019"/>  
 </listOfReactants>  
 <listOfProducts>  
 <speciesReference species="M\_cpd15800\_c"/>  
 </listOfProducts>  
 <kineticLaw>  
 <math xmlns="http://www.w3.org/1998/Math/MathML">  
 <ci> FLUX\_VALUE </ci>  
 </math>

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_bio00006" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: </p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00002_c" stoichiometry="105.003"/>
    <speciesReference species="M_C00006_c" stoichiometry="0.001053"/>
    <speciesReference species="M_C00005_c" stoichiometry="0.0002367"/>
    <speciesReference species="M_C00010_c" stoichiometry="0.000127618"/>
    <speciesReference species="M_C00003_c" stoichiometry="0.01822"/>
    <speciesReference species="M_C00013_c" stoichiometry="0.0008548"/>
    <speciesReference species="M_C00020_c" stoichiometry="0.005253"/>
    <speciesReference species="M_C00001_c" stoichiometry="105"/>
    <speciesReference species="M_C00055_c" stoichiometry="0.001153"/>
    <speciesReference species="M_C00112_c" stoichiometry="0.0002924"/>
    <speciesReference species="M_C00305_c" stoichiometry="0.09474"/>
    <speciesReference species="M_C00063_c" stoichiometry="0.0006105"/>
    <speciesReference species="M_C00044_c" stoichiometry="0.0004883"/>
    <speciesReference species="M_C00035_c" stoichiometry="0.0002215"/>
    <speciesReference species="M_C00229_c" stoichiometry="0.000273109"/>
    <speciesReference species="M_C00144_c" stoichiometry="0.0005939"/>
    <speciesReference species="M_C14819_c" stoichiometry="0.003209"/>
    <speciesReference species="M_cpd15800_c" stoichiometry="0.076"/>
    <speciesReference species="M_C00238_c" stoichiometry="0.6576"/>
    <speciesReference species="M_C00017_c" stoichiometry="0.5284"/>
    <speciesReference species="M_C00828_c" stoichiometry="0.00014977"/>
    <speciesReference species="M_C00076_c" stoichiometry="0.002983"/>
    <speciesReference species="M_cpd11462_c" stoichiometry="0.0655"/>
    <speciesReference species="M_C00039_c" stoichiometry="0.026"/>
    <speciesReference species="M_cpd15664_c" stoichiometry="0.2242"/>
    <speciesReference species="M_cpd15670_c" stoichiometry="0.0304"/>
    <speciesReference species="M_C00234_c" stoichiometry="0.000206831"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C00008_c" stoichiometry="104.997"/>
  <speciesReference species="M_C00009_c" stoichiometry="104.987"/>
  <speciesReference species="M_C03688_c" stoichiometry="0.000273109"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="1"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn11921" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Fatty Acids and Lipids</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd16488_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_cpd15696_c" stoichiometry="5.35e-05"/>
    <speciesReference species="M_cpd15538_c" stoichiometry="5.33e-05"/>
    <speciesReference species="M_cpd15727_c" stoichiometry="5.33e-05"/>
    <speciesReference species="M_cpd15799_c" stoichiometry="2.85e-05"/>
    <speciesReference species="M_cpd15529_c" stoichiometry="6.06e-05"/>
    <speciesReference species="M_cpd15531_c" stoichiometry="5.57e-05"/>
    <speciesReference species="M_cpd15533_c" stoichiometry="5.15e-05"/>
    <speciesReference species="M_cpd15536_c" stoichiometry="5.78e-05"/>
    <speciesReference species="M_cpd15540_c" stoichiometry="4.95e-05"/>
    <speciesReference species="M_cpd15695_c" stoichiometry="5.35e-05"/>
    <speciesReference species="M_cpd15697_c" stoichiometry="6.06e-05"/>
    <speciesReference species="M_cpd15698_c" stoichiometry="5.8e-05"/>
    <speciesReference species="M_cpd15699_c" stoichiometry="5.8e-05"/>
    <speciesReference species="M_cpd15700_c" stoichiometry="5.57e-05"/>
    <speciesReference species="M_cpd15722_c" stoichiometry="5.14e-05"/>
    <speciesReference species="M_cpd15723_c" stoichiometry="5.14e-05"/>
  </listOfProducts>

```

```

<speciesReference species="M_cpd15724_c" stoichiometry="5.78e-05"/>
<speciesReference species="M_cpd15725_c" stoichiometry="5.55e-05"/>
<speciesReference species="M_cpd15726_c" stoichiometry="5.55e-05"/>
<speciesReference species="M_cpd15791_c" stoichiometry="2.85e-05"/>
<speciesReference species="M_cpd15792_c" stoichiometry="3.11e-05"/>
<speciesReference species="M_cpd15793_c" stoichiometry="2.63e-05"/>
<speciesReference species="M_cpd15794_c" stoichiometry="2.74e-05"/>
<speciesReference species="M_cpd15795_c" stoichiometry="2.74e-05"/>
<speciesReference species="M_cpd15797_c" stoichiometry="2.97e-05"/>
<speciesReference species="M_cpd15798_c" stoichiometry="2.97e-05"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_rxn05296" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU00670 and BSU00990 and BSU01030 and BSU01040
and BSU01050 and BSU01100 and BSU01110 and BSU01150 and BSU01160 and BSU01170
and BSU01180 and BSU01190 and BSU01200 and BSU01210 and BSU01220 and BSU01230
and BSU01240 and BSU01250 and BSU01260 and BSU01270 and BSU01280 and BSU01290
and BSU01300 and BSU01310 and BSU01320 and BSU01330 and BSU01340 and BSU01350
and BSU01400 and BSU01410 and BSU01420 and BSU01440 and BSU01490 and BSU01500
and BSU15080 and BSU15820 and BSU15990 and BSU16040 and BSU16490 and BSU16680
and BSU24900 and BSU25410 and BSU25550 and BSU27940 and BSU27960 and BSU28850
and BSU28860 and BSU29660 and BSU37070 and BSU40500 and BSU40890 and BSU40910
and BSU41060 and BSU15730 )</p>
      <p>GENE_LIST: BSU00670 BSU00990 BSU01030 BSU01040 BSU01050 BSU01100
BSU01110 BSU01150 BSU01160 BSU01170 BSU01180 BSU01190 BSU01200 BSU01210
BSU01220 BSU01230 BSU01240 BSU01250 BSU01260 BSU01270 BSU01280 BSU01290
BSU01300 BSU01310 BSU01320 BSU01330 BSU01340 BSU01350 BSU01400 BSU01410
BSU01420 BSU01440 BSU01490 BSU01500 BSU15080 BSU15820 BSU15990 BSU16040
BSU16490 BSU16680 BSU24900 BSU25410 BSU25550 BSU27940 BSU27960 BSU28850
BSU28860 BSU29660 BSU37070 BSU40500 BSU40890 BSU40910 BSU41060 BSU15730</p>
      <p>SUBSYSTEM: Macromolecular Synthesis</p>
    </html>
  </notes>
</reaction>

```

</notes>

<listOfReactants>

<speciesReference species="M\_C00886\_c" stoichiometry="0.5051"/>  
<speciesReference species="M\_C02163\_c" stoichiometry="0.3653"/>  
<speciesReference species="M\_C02984\_c" stoichiometry="0.2801"/>  
<speciesReference species="M\_C03402\_c" stoichiometry="0.2801"/>  
<speciesReference species="M\_C03125\_c" stoichiometry="0.1073"/>  
<speciesReference species="M\_C02987\_c" stoichiometry="0.4928"/>  
<speciesReference species="M\_C02282\_c" stoichiometry="0.4928"/>  
<speciesReference species="M\_C02412\_c" stoichiometry="0.7723"/>  
<speciesReference species="M\_C02988\_c" stoichiometry="0.1546"/>  
<speciesReference species="M\_C03127\_c" stoichiometry="0.5107"/>  
<speciesReference species="M\_C02047\_c" stoichiometry="0.6555"/>  
<speciesReference species="M\_C01931\_c" stoichiometry="0.6114"/>  
<speciesReference species="M\_C02430\_c" stoichiometry="0.2145"/>  
<speciesReference species="M\_C03511\_c" stoichiometry="0.3329"/>  
<speciesReference species="M\_C02702\_c" stoichiometry="0.3041"/>  
<speciesReference species="M\_C02553\_c" stoichiometry="0.4091"/>  
<speciesReference species="M\_C02992\_c" stoichiometry="0.3526"/>  
<speciesReference species="M\_C03512\_c" stoichiometry="0.1028"/>  
<speciesReference species="M\_C02839\_c" stoichiometry="0.2097"/>  
<speciesReference species="M\_C02554\_c" stoichiometry="0.5807"/>

</listOfReactants>

<listOfProducts>

<speciesReference species="M\_C00017\_c"/>  
<speciesReference species="M\_C01635\_c" stoichiometry="0.5051"/>  
<speciesReference species="M\_C01636\_c" stoichiometry="0.3653"/>  
<speciesReference species="M\_C01638\_c" stoichiometry="0.2801"/>  
<speciesReference species="M\_C01637\_c" stoichiometry="0.2801"/>  
<speciesReference species="M\_C01639\_c" stoichiometry="0.1073"/>  
<speciesReference species="M\_C01641\_c" stoichiometry="0.4928"/>  
<speciesReference species="M\_C01640\_c" stoichiometry="0.4928"/>  
<speciesReference species="M\_C01642\_c" stoichiometry="0.7723"/>  
<speciesReference species="M\_C01643\_c" stoichiometry="0.1546"/>  
<speciesReference species="M\_C01644\_c" stoichiometry="0.5107"/>  
<speciesReference species="M\_C01645\_c" stoichiometry="0.6555"/>  
<speciesReference species="M\_C01646\_c" stoichiometry="0.6114"/>  
<speciesReference species="M\_C01647\_c" stoichiometry="0.2145"/>  
<speciesReference species="M\_C01648\_c" stoichiometry="0.3329"/>  
<speciesReference species="M\_C01649\_c" stoichiometry="0.3041"/>  
<speciesReference species="M\_C01650\_c" stoichiometry="0.4091"/>  
<speciesReference species="M\_C01651\_c" stoichiometry="0.3526"/>  
<speciesReference species="M\_C01652\_c" stoichiometry="0.1028"/>  
<speciesReference species="M\_C00787\_c" stoichiometry="0.2097"/>



```

    <speciesReference species="M_C01653_c" stoichiometry="0.5807"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R01623" name="" reversible="false">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Cofactors, Vitamins, Prosthetic Groups, Pigments</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00229_c"/>
    <speciesReference species="M_C00001_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C01134_c"/>
    <speciesReference species="M_C03688_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_T00001" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>

```

```

    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00080_e"/>
  <speciesReference species="M_C00079_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00079_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00244" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00079_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00245" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00898_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00246" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00134_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00247" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01613_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00248" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00246_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```

```

<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00249" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C06892_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_T00245" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>

```

```

    <speciesReference species="M_C00898_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00898_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_T00246" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00134_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00134_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_T00247" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">

```

```

    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C01613_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C01613_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_T00248" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00246_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00246_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_T00249" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C06892_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C06892_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_R02949" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00810_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C01769_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">

```



```

    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_T00003" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd16500_c"/>
    <speciesReference species="M_C00003_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C01769_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00080_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_T00250" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>

```

```

</notes>
<listOfReactants>
  <speciesReference species="M_cpd16500_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_cpd16500_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_T00251" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00810_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00810_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_T00252" name="">

```

```

<notes>
  <html xmlns="http://www.w3.org/1999/xhtml">
    <p>GENE_ASSOCIATION: </p>
    <p>GENE_LIST: </p>
    <p>SUBSYSTEM: Membrane Transport</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C01769_e"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C01769_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00250" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_cpd16500_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    </listOfParameters>
  </kineticLaw>
</reaction>

```

```

    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00251" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00810_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00252" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C01769_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>

```

```

</math>
<listOfParameters>
  <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_T00253" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C19891_e"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C19891_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_T00254" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Membrane Transport</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C06153_e"/>
  </listOfReactants>

```

```

<listOfProducts>
  <speciesReference species="M_C06153_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_T00004" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU39680</p>
      <p>GENE_LIST: BSU39680</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_TC0001_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00691_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_T00005" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: BSU39700</p>
      <p>GENE_LIST: BSU39700</p>

```

```

    <p>SUBSYSTEM: Carbohydrates</p>
  </html>
</notes>
<listOfReactants>
  <speciesReference species="M_C00003_c"/>
  <speciesReference species="M_C19891_c"/>
</listOfReactants>
<listOfProducts>
  <speciesReference species="M_C00080_c"/>
  <speciesReference species="M_C00004_c"/>
  <speciesReference species="M_TC0001_c"/>
</listOfProducts>
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_T00006" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: ( BSU10850 or BSU33530 )</p>
      <p>GENE_LIST: BSU10850 BSU33530</p>
      <p>SUBSYSTEM: Carbohydrates</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C00003_c"/>
    <speciesReference species="M_C06153_c"/>
  </listOfReactants>
  <listOfProducts>
    <speciesReference species="M_C00080_c"/>
    <speciesReference species="M_C00004_c"/>
    <speciesReference species="M_C00691_c"/>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>

```

```

<listOfParameters>
  <parameter id="LOWER_BOUND" value="-1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
  <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
</listOfParameters>
</kineticLaw>
</reaction>
<reaction id="R_E00253" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C19891_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>
  <kineticLaw>
    <math xmlns="http://www.w3.org/1998/Math/MathML">
      <ci> FLUX_VALUE </ci>
    </math>
    <listOfParameters>
      <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
      <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
      <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
    </listOfParameters>
  </kineticLaw>
</reaction>
<reaction id="R_E00254" name="">
  <notes>
    <html xmlns="http://www.w3.org/1999/xhtml">
      <p>GENE_ASSOCIATION: </p>
      <p>GENE_LIST: </p>
      <p>SUBSYSTEM: Exchange</p>
    </html>
  </notes>
  <listOfReactants>
    <speciesReference species="M_C06153_e"/>
  </listOfReactants>
  <listOfProducts>
  </listOfProducts>

```



```
<kineticLaw>
  <math xmlns="http://www.w3.org/1998/Math/MathML">
    <ci> FLUX_VALUE </ci>
  </math>
  <listOfParameters>
    <parameter id="LOWER_BOUND" value="0" units="mmol_per_gDW_per_hr"/>
    <parameter id="UPPER_BOUND" value="1000" units="mmol_per_gDW_per_hr"/>
    <parameter id="OBJECTIVE_COEFFICIENT" value="0"/>
  </listOfParameters>
</kineticLaw>
</reaction>
</listOfReactions>
</model>
</sbml>
```