SUPPLEMENTARY MATERIALS:

Penicillin's Auto-Catalytic Mechanism Revealed by Inelastic Neutrons and Quantum Theory

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1. PROLOLOGUE

Due to the lack of the Penicillin binding protein (PBP) in the human body, penicillin-type antibiotics may be considered as targeted, bacteria specific antibiotics.[4,7] The bacterial enzyme to be inhibited, transpeptidase, transfers a D-Ala-D-Ala dipetide within within the bacterial cell wall synthesis as illustrated by **Figure S1**. Resistant strains have developed some defending mechanism against these antibiotics. β-lactamase is synthesized by the micro-organisms for deactivation of Penicillin-type compounds transpeptidase and β-lactamase enzymes have similar mechanisms (**Figure S2**) but there is some difference in their rate constants.[8] From chemical point of view, penicillin acylates the serine residue of both transpeptidase and β-lactamase, resulting in a covalently bonded entity. The kinetics however is different of the two enzymes (**Figure S2**).

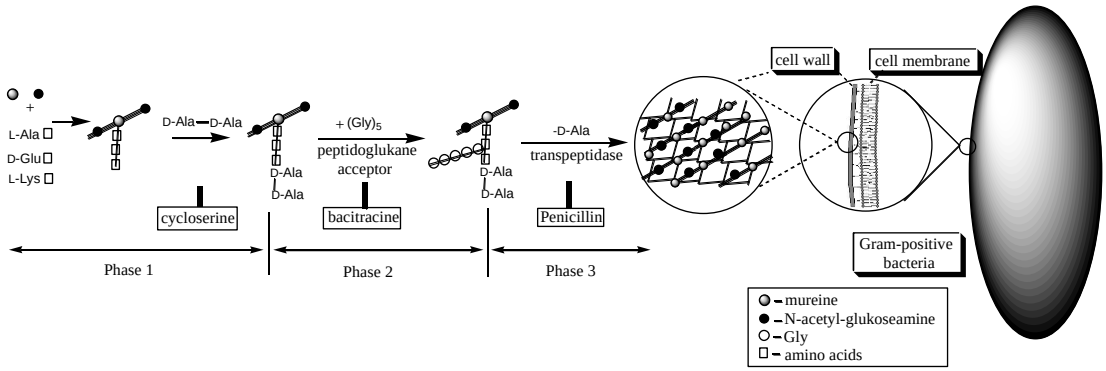


Fig. S1. A schematic representation of the synthesis of cell wall of Gram-positive bacteria.

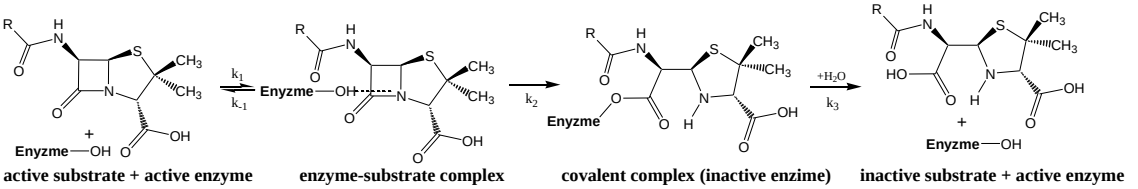


Fig. S2. Mechanism of biological action of Penicillin. In the case of the transpeptidase $k_2 >> k_3$, the substrate is trapped in the enzyme and both the substrate and the enzyme are deactivated.[9] For β-lactamase, $k_3 >> k_2$, thus the covalently bonded enzyme-substrate complex can hydrolyze and the enzyme still remain active while the substrate is rendered inactive resulting in resistance.

2. EXPERIMENTAL SECTION

2.1 Synthesis of penicillin-G dimethylamide (4).

Penicillin-G carboxylic acid (**2**): Penicillin-G sodium salt (5 g, 14 mmol; purchased from Fluka) was dissolved in an ethylacetate (100 mL)/water (50 mL) mixture. Then, 1N aq. HCl (15 mL) was added drop-wise with stirring. The aqueous phase was extracted with ethylacetate (50 mL) the combined ethylacetate phases washed (brine), dried ($MgSO_4$) and the solvent evaporated under reduced pressure, yielding 2 (4.6 g, 99 %) as a white semisolid. ^{1}H NMR ($CDCl_3$, 500 MHz): δ 7.26–7.36 (m, 5H, Ph); 6.20 (d, J = 9.2 Hz, 1H, NH-2); 5.48 (d, J = 4.0 Hz, 1H, H-4); 5.45 (dd, J = 4.0, 9.2 Hz, 1H, H-3); 4.64 (s, 1H, H-7); 3.47 (s, 2H, CH_2–Ph); 1.40 (s, 3H, MeB-6); 1.33 (s, 3H, MeA-6); 13C NMR(CDCl3, 125 MHz): δ 174.1 (CO-2); 170.1 ($PhCH_2CONH$); 168.9 (CON-7); 134.1 (ipsoC, Ph); 129.6 (C, Ph); 129.2 (C, Ph); 127.6 (C, Ph); 70.2 (C-4); 64.6 (C-7); 64.6 (C-6); 64.5 (C-3); 42.9 (CH_2–Ph); 33.2 (MeB-6); 28.1 (MeA-6); UPLC-HR-MS (SHIMADZU): [M+H$^+$; Da] 335.0969 (calcd. for $C_{18}H_{23}N_3O_3S$: 334. 0987];

Penicillin-G dimethylamide (**4**): Compound **2** (2.5 g, 7.46 mmol) was dissolved in of dry THF (30 mL) containing triethylamine (0.77 g, 7.5 mmol). The mixture was cooled down to 0–5 °C, then of isobutyl chloroformate (0.70 g, 7.0 mmol) was added drop-wise within 15 min (the colour changed to red). The reaction mixture was stirred for 5 min, then dimethylamine (2M soln. in THF; 3.5 mL; 7.0 mmol) was added over 15 min at 0–5 °C. The volatiles were removed under reduced pressure at 10–15 °C, and the residue partitioned in ethylacetate (100 mL) and water (50 mL). The organic phase was washed with 3% Na_2CO_3 solution (2 × 30 mL), brine (15 mL), dried ($MgSO_4$) and the solvent removed under reduced pressure, yielding **4** (2.0 g, 74.2; 95% pure by HPLC) as a yellow solid. ^{1}H NMR ($CDCl_3$, 500 MHz): δ 7.28–7.38 (m, 5H, Ph); 6.13 (d, J = 9.2 Hz, 1H, NH-2); 5.69 (d, J = 4.0 Hz, 1H, H-4); 5.61 (dd, J = 4.0, 9.2 Hz, 1H, H-3); 4.83 (s, 1H, H-7); 3.66 (s, 2H, CH_2–Ph); 3.07 (s, 3H, $CONMe_2$B-7); 2.98 (s, 3H, $CONMe_2$A-7); 1.43 (s, 3H, MeB-6); 1.37 (s, 3H, MeA-6); 13C NMR(CDCl3, 125 MHz): δ 173.0 (CO-2); 170.3 ($PhCH_2CONH$); 167.19 (CON-7); 134.0 (ipsoC, Ph); 129.7 (C, Ph); 129.1 (C, Ph); 127.6 (C, Ph); 69.2 (C-4); 65.7 (C-7); 64.6 (C-6); 59.4 (C-3); 43.5 (CH2–Ph); 37.7 ($CONMe_2$B-7); 35.5 ($CONMe_2$A-7); 34.3 (MeB-6); 26.3 (MeA-6); UPLC-HR-MS (SHIMADZU): [M+H$^+$; Da] 362.1456 (calcd. for $C_{18}H_{23}N_3O_3S$: 361.1460];

2.2 Kinetic measurements. We examined the hydrolysis of penicillin-G (**1**), penicillin-G dimethylamide (**4**), 2-azetidinone (**5**) and dimethylacetamide (**6**), in a number of buffers (**Table S1**), and the rates of the reactions were measured by HPLC-UV-MS (AGILENT-1200). 300 µL of the reactant solution [496 mg of penicillin-G (**1**), 505 mg of penicillin-G dimethylamide (**4**), 200 mg of 2-azetidinone (**6**), 300 µL dimethylacetamide (**DMA**, **6**) and 200 mg of benzoic acid (used as an internal standard) dissolved in the mixture of 1mL of EtOH and 1ml of water] was added to 5 mL of buffer (**Table S1**) and 1 mL of EtOH, then stirred at 80 ^{o}C. The integral ratio of the corresponding HPLC peaks and the benzoic acid was used to determine the rate constant, using quasi first order approach (one example presented in **Fig. S3**).

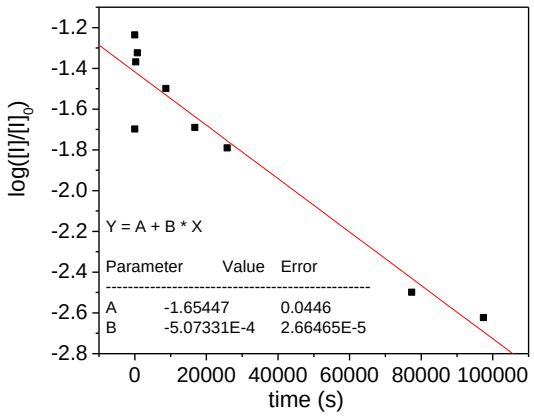


Fig. S3. An example for line fitting, determining the hydrolysis rate (penicillin-G, at 80 C, in pH 3.89 buffer), where k = ln(B).

Table S1. Buffers to use for kinetic measurements.

No	pH	Composition
1	0.87	3.73 g of KCl, 134 ml of 1 mol/L HCl solution, to 1 L
2	1.92	6.43 g of citric acid, 3.58 g of NaCl, 8.2 mL of 1 mol/L HCl, diluted to 1 L
3	2.87	8.47 g of citric acid, 3.49 g of NaCl, 20.6 mL of 1 mol/L NaOH, diluted to L
4	3.84	11.76 g of citric acid, 2.57 g of NaCl, 68.0 mL of 1 mol/L NaOH, diluted to 1 L
5	6.76	1.36 g f KH_2PO_4 (anh), 1.74 g of K_2HPO_4 (anh) diluted to 1 L
6	8.60	4.77 g of $Na_2B_4O_7.10H_2O$, 20.5 ml of 1mol/L HCl, diluted to 1 L
7	9.64	4.77 g of $Na_2B_4O_7.10H_2O$, 4.6 ml of 1mol/L HCl, diluted to 1 L
8	10.88	4.77 g of $Na_2B_4O_7.10H_2O$, 18.3 mL of 1mol/L NaOH, diluted to 1 L
9	11.96	3.7 g of KCl, 6.21 g of H_3BO_3, 4g of NaOH, diluted to 1 L
10	12.81	4.45 g of $Na_2HPO_4.2H_2O$, 0.9 g of NaOH, diluted to 1 L
11	13.56	0.222 g of NaCl, 95 ml of 1 mol/l NaOH, diluted to 1 L

Table S2a. Reaction rate (k), its error in %, k_{rel} and log(k_{rel}) of **1** and **4** measured experimentally in different pH.

No	pH	k[1]	error (%)	$k[1]_{rel}$	log($k[1]_{rel}$)	k[5]	error (%)	$k[5]_{rel}$	log($k[5]_{rel}$)
1	0.87	–	–	–	**–**	–	–	–	**–**
2	1.92	-1.10E-02	5.25	6.76E+07	**7.83**	-2.53E-01	13.60	1.55E+09	**8.3**
3	2.87	-5.78E-03	4.43	3.55E+07	**7.55**	-2.24E-01	0.54	1.37E+09	**8.2**
4	3.84	-5.07E-04	11.38	5.75E+06	**6.76**	-1.26E-02	1.43	7.73E+07	**7.9**
5	6.76	-1.74E-04	0.74	1.07E+06	**6.03**	-4.20E-04	13.89	2.58E+06	**6.4**
6	8.60	-3.10E-04	22.81	1.91E+06	**6.28**	-3.82E-03	3.95	2.35E+07	**7.7**
7	9.64	-1.67E-04	15.64	1.02E+06	**6.01**	-2.65E-02	7.39	1.63E+08	**7.4**
8	10.88	-6.95E-04	12.32	4.27E+06	**6.63**	-2.42E-01	8.65	1.49E+09	**8.2**
9	11.96	-5.27E-04	5.32	3.24E+06	**6.51**	-3.73E-03	12.49	2.29E+07	**9.2**
10	12.81	-2.00E-01	10.10	1.23E+09	**9.09**	-1.63E+00	21.23	1.01E+10	**10.0**
11	13.56	–	–	–	**–**	–	–	–	**–**

k = slope of the fitting; k_{rel} = k / {k[6](pH=6.76)}

Table S2a. Reaction rate (k), its error in %, k_{rel} and log(k_{rel}) of **5** and **6** measured experimentally in different pH.

No	pH	k[5]	error (%)	$k[5]_{rel}$	log($k[5]_{rel}$)	k[6]	error (%)	$k[6]_{rel}$	log($k[6]_{rel}$)
1	0.87	-5.03E-04	57.63	3.09E+06	**6.49**	-7.79E-06	6.32	4.79E+04	**4.68**
2	1.92	-2.35E-05	83.60	1.45E+05	**5.16**	-1.00E-08	3.10	6.17E+01	**1.79**
3	2.87	-2.00E-05	6.29	1.23E+05	**5.09**	-1.63E-09	10.10	1.00E+01	**1.00**
4	3.84	-1.32E-05	20.60	8.13E+04	**4.91**	-1.00E-09	12.01	6.17E+00	**0.79**
5	6.76	-3.82E-05	4.10	2.34E+05	**5.37**	-1.63E-10[a]	8.33	1.00E+00	**0.00**
6	8.60	-1.63E-04	23.10	1.00E+06	**6.00**	-1.00E-09	9.53	6.17E+00	**0.79**
7	9.64	-5.15E-04	8.18	3.16E+06	**6.50**	-3.64E-07	11.73	2.24E+03	**3.35**
8	10.88	-1.63E-03	10.20	1.00E+07	**7.00**	-4.18E-07	4.90	2.57E+03	**3.41**
9	11.96	-5.15E-03	2.87	3.16E+07	**7.50**	-8.35E-07	5.41	5.13E+03	**3.71**
10	12.81	-5.15E-01	57.63	3.16E+09	**9.50**	-1.63E-06	102.66	1.00E+04	**4.00**
11	13.56	–	–	–	**–**	-2.58E-04	2.41	1.58E+06	**6.20**

k = slope of the fitting; k_{rel} = k / {k[6](pH=6.76)}; [a]calculated from REF: Smith, R. M.; Hansen, D. E. *J. Am. Chem. Soc*. **1998**, *120*, 8910–8913.

2.3 Computational methods. All computations were carried out with the Gaussian09 program package (G09),[42] using convergence criteria of 3.0×10^{-4}, 4.5×10^{-4}, 1.2×10^{-3} and 1.8×10^{-3}, for the Maximum Force, gradients of the root mean square (RMS) Force, maximum displacement and RMS displacement vectors, respectively.

Geometry optimizations and subsequent frequency analyses were carried out on selected amide-containing systems from which the values for the enthalpy of hydrogenation (ΔH_{H2}) were extracted. Computations were carried out at the B3LYP/6-31G(d,p) and MP2(full)/DZVP level of theory (for Hartree energy see **Table S6** and **S7**).[43] Method and basis sets was chosen for its reliability in the characterization of amidicity in agreement with works established earlier.[6–9] The vibrational frequencies were computed at the same levels of theory as used for geometry optimization, in order to properly confirm all structures as residing at minima on their potential energy hypersurfaces (PESs). Thermodynamic functions *U*, *H*, G and S (listed in the Supporting Information, **Table S1–S2**) were computed at 298.15 K, using the quantum chemical, rather than the conventional, thermodynamic reference state.

2.4 Docking methods: The 3D stucture of enzyme–ligand complex was downloaded from the PDB database[1], PDB ID: 1HVB[2]. This stucture is not suitable for docking calculations, because it contains the final structure of the action, namely the covalent complex between the ligand and Ser62. Therefore the following steps were applied in order to prepare the structure for docking calculations using AutoDock 4.01[3]. The covalent linkage was eliminated in the complex and the beta-lactam ring was prepared again, as well, the hydrogens were added via Molecular Operating Environment 2006.08[4]. The possible hydrogen bonding interactions were optimized via the PDB2PQR program package[5]. The following modifications were employed on the protonation states of the amino acids: Hip16, Hid37, Hid108, Hie147, Hip177, Hip200, Hip210, Hip298, deprotonated Tyr159 (see ref [2]). The H's were added to the ligand also, those water molecules (WAT) which were in close contact (van der Waals) with the ligand were deleted from the model (**Fig S4**).

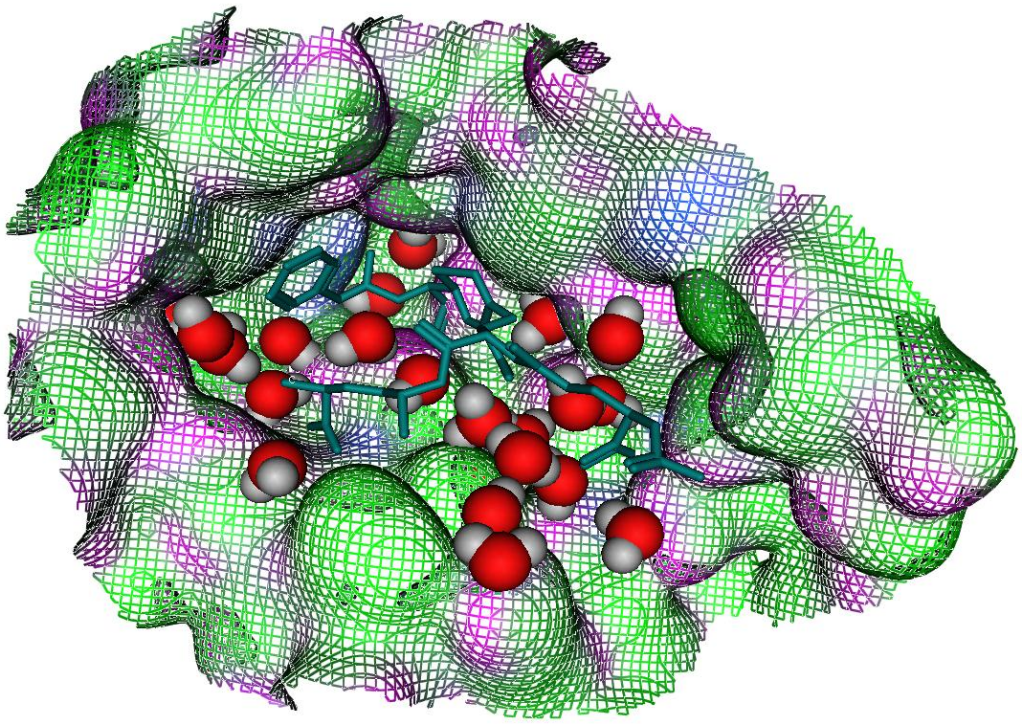


Fig S4. The surface, and the location of water molecules (space filling representation) at the binding site. The ligand is in stick representation. The green surface part is hydrophobic, the purple is potential H-bond interaction sites, and the blue one is mild polar.

In order to obtain the initial receptor – ligand complex the following minimizations were performed: (1) rigid protein, flexible WAT and ligand: MMFF94s forcefield[6], grad <0.1, cut-off 10 Å; (2) ligand and those residues that were closer than 5 Å to the ligand were rigid, and the remaining part of the complex was flexible: AMBER99 forcefield, grad<0.1; (3) ligand and those residues that were closer than 5 Å to the ligand were flexible, and the remaining part of the complex was rigid: MMFF94s forcefield, grad<0.1. The minimization was performed by means of Molecular Operating Environment 2006.08.[4] The amino acid RMSD value between the initial and the final structure is 0.51 Å, the ligand showed a larger movement (0.91 Å).

The necessary coordinate and docking files were prepared by means of MGLTools 1.5.0 program package. The penicillin was moved manually in the binding pocket, and the grid box was centred on the geometry centre of the molecule, the grid point in each direction was set 40, and 0.375 Å grid spacing was applied. During the docking

calculations the Lamarckien genetic algorithm was applied[7] with the following options: number of energy evaluation: 2.5×10^6, number of generation: 27,000, translation step size: 0.5 Å, quaternion and torsional step size: 5º, 100 docking calculation, 2.0 Å cluster tolerance.

The docking calculations revealed in one cluster, where the lowest ΔG_{bind} was –6.46 kcal/mol, and the mean ΔG_{bind} -5.99 kcal/mol (**Fig S5**).

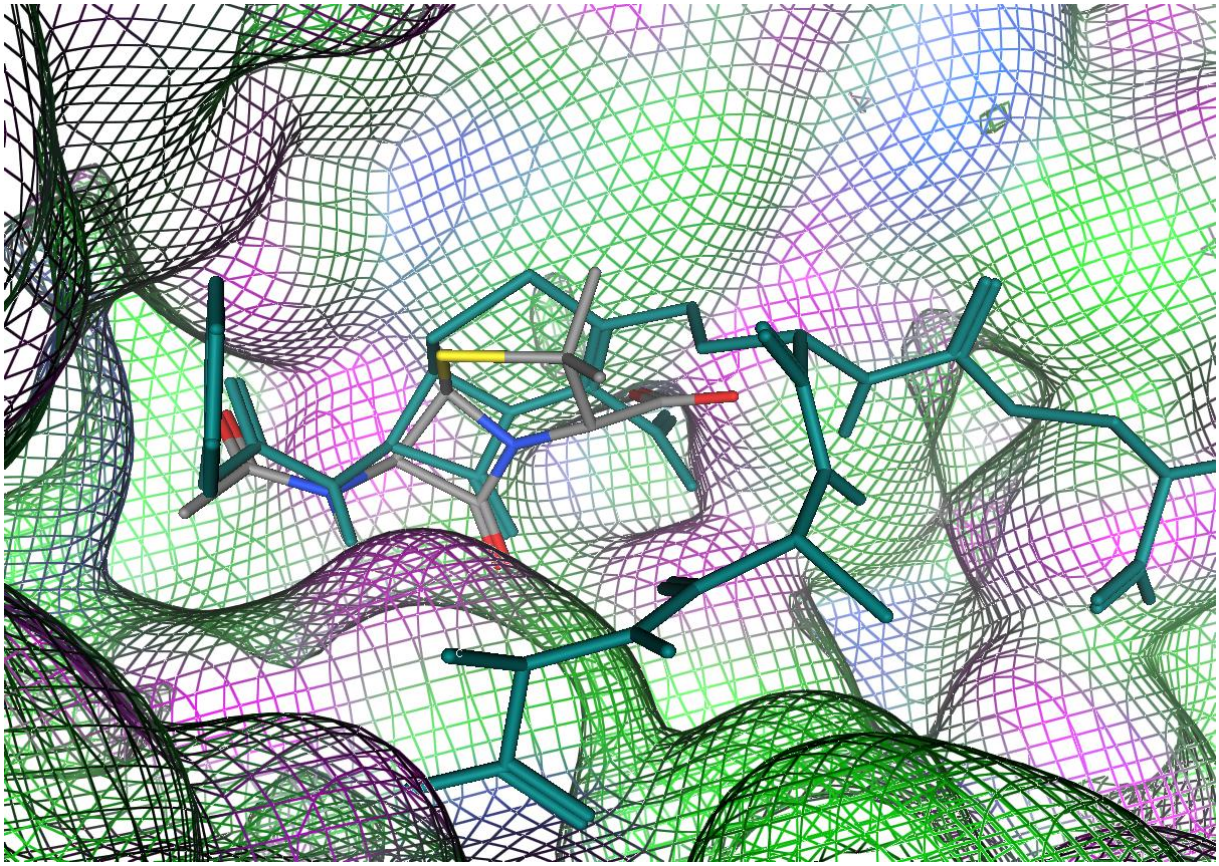


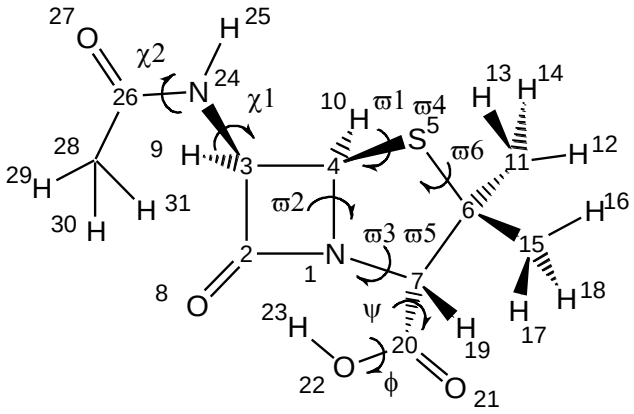
Fig S5. The locations of the docked penicillin (coloured by atom type). The location of the initial ligand conformation as depicted, as well.

During the docking calculations the enzyme was kept rigid, therefore the ligand structure with the lowest ΔG_{bind} and the enzyme complex was optimized via molecular mechanics method by means of Molecular Operating Environment 2006.08[4]: MMFF94s forcefield, cut-off 10 Å, grad<0.01, ligand and those residues that were closer than 10 Å to the ligand were flexible.

3. CONFORMATIONAL ANALYSIS

3.1 Modular Numbering of different 6APA models

In this paper the acetylated penicillin model was considered [Ac-APA-COOH], in addition to its deprotonated forms [Ac-APA-$COO^{(-)}$]. All constituent atoms were numbered in a modular way, as depicted in **Fig. S6**, **Table S3** and S**4**. Future works may build upon the central model (*i.e.* attaching longer R groups), while preserving the numerically defined components (atoms and geometry). This allows for simplified and more accurate use of pre-computed data. The dihedrals $C_{26}N_{24}$–C_3C_2, $H_{28}C_{26}$–$N_{24}C_3$, $O_{22}C_{20}$–C_7N_1, and $H_{23}O_{22}$–$C_{20}C_7$ in these preliminary models were attempted at *syn*, *gauche+*, *anti* and *gauche–* to search for all possible conformers in gas phase at 0 K. The conformers were optimized at B3LP/6-31G(d,p) and MP2(full)/DZVP levels of theory, followed by frequency calculation. The torsion angle ϕ has no meaning for the deprotonated compound (**1**). The exploration of the *cis* amide bond was omitted from this study, as it exhibits relatively high energy values.



	Axial	Equatorial
ϖ1	–2.3	31.2
ϖ2	110.6	132.6
ϖ3	161.2	124.4
ϖ4	96.0	127.9
ϖ5	157.0	122.6
ϖ6	142.2	89.2

Fig. S6. Modular atomic numbering scheme and dihedral angles definitions for β-lactam model. $\chi^1 \equiv C_2C_3 - N_{24}C_{26}$; $\chi^2 \equiv C_3N_{24} - C_{26}H_{28}$; $\psi \equiv N_1C_7 - C_{20}O_{22}$; $\varphi \equiv C_7C_{20} - O_{22}H_{23}$; $\omega^1 \equiv C_6S_5 - C_4N_1$; $\omega^2 \equiv C_2N_1 - C_4S_6$; $\omega^3 \equiv C_{20}C_7 - N_1C_2$; $\omega^4 \equiv C_6S_5 - C_4C_3$; $\omega^5 \equiv H_{19}C_7 - N_1C_4$; $\omega 6 \equiv C_{11}C_6 - S_5$

Table S3. Summary and short-hand nomenclature of the molecular conformational structures explored for (**1**) and (**2**) [*s* ≡ *syn* (0°); *a* ≡ *anti* (180°); + ≡ *gauche*+ (60°)].

Model	(**1**)			(**2**)			
	χ^1	χ^2	ψ	χ^1	χ^2	ψ	φ
c1	s	a	s	s	a	s	s
c2				s	a	s	a
c3				s	a	+	s
c4				s	a	a	s
c5	s	a	a	s	a	a	a
c6	a	a	s	a	a	s	s
c7				a	a	s	a
c8				a	a	+	s
c9				a	a	a	s
c10	a	a	a	a	a	a	a

Table S4. Calculated relative energies (Δ*E*), zero point corrected energies (ΔE_{ZPE}), internal energies (Δ*U*), enthalpies (Δ*H*) and Gibbs free energies (Δ*G*) in kJ mol^{-1} and entropies (*S*) in J mol^{-1} K^{-1} for the penicillin conformers in neutral (**2**) and in anionic (**1**) forms, computed at the B3LYP/6-31G(d,p) level of theory.

Conformers	**Δ*E*** (kJ mol^{-1})	**ΔE_{ZPE}** (kJ mol^{-1})	**Δ*U*** (kJ mol^{-1})	**Δ*H*** (kJ mol^{-1})	**Δ*G*** (kJ mol^{-1})	**Δ*S*** (J mol^{-1}K^{-1})
c1 (2)	27.25	26.63	26.13	26.13	29.24	-10.44
c2 (2)	23.99	23.93	23.73	23.73	26.08	-7.86
c3 (2)	44.02	43.66	43.35	43.35	47.00	-12.22
c4 (2)	48.17	47.18	47.14	47.14	49.52	-7.95
c5 (2)	21.63	21.57	21.35	21.35	24.06	-9.05
c6 (2)	15.40	14.63	12.07	12.07	18.24	-20.65
c7 (2)	1.82	1.79	1.85	1.85	1.29	1.86
c8 (2)	3.97	4.38	3.87	3.87	5.99	-7.10
c9 (2)	29.13	27.53	25.59	25.60	31.42	-19.49
c10 (2)	0.00	0.00	0.00	0.00	0.00	0.00
c1 (1)	57.03	56.08	56.26	56.26	56.04	0.76
c5 (1)	43.29	42.43	42.42	42.42	44.18	-5.90
c6 (1)	8.43	8.62	8.74	8.74	7.71	3.46
c10 (1)	0.00	0.00	0.00	0.00	0.00	0.00

Δ*E*, ΔE_{ZPV}, Δ*U*, Δ*H*, Δ*G* values are expressed in kJ mol^{-1}; 1 Hartree = 2625.4997 kJ.mol^{-1}; ΔS values are expressed in: J mol^{-1} K)$^{-1}$;

4. AMIDICITY PERCENTAGE (AM %) AND ITS RESONANCE ENTHALPIES [H_{RE}(AM)]

The "amidicity scale", quantifying amide bond strength on a linear scale, based on the computed enthalpy of hydrogenation [ΔH_{H2}(AM); Eq. S6; **Fig. S7A** and **B**, **Table S5**] of the compound examined, comparing to reference compounds **I** and **II**. The ΔH_{H2}(AM) value for dimethylacetamide (**I**) is used to define perfect amidic character (Eq. S7.; AM % = +100%), while azaadamantane-2-one (**II**) represents complete absence of amidic character (AM % = 0%).

In order to obtain accurate values for ring structures, like penicillin, one should consider the change of the ring strain in the hydrogenation reaction process, where an sp^2–hybridized C atom (with ~120º bond angle) may distort towards sp^3–hybridization (with ~109º bond angles). For this reason, reference hydrogenation reactions were considered, where the cycloalkene with similar ring structure was hydrogenated to the appropriate cycloalkane [ΔH_{H2}(RS1), **Fig. S7C**, Eq. S2]. These values were compared with the corresponding ΔH_{H2} of *cis*-2-butene changing to *gauche* butane [ΔH_{H2}(RS2), **Fig. S7C**, Eq. S3], thereby obtaining, for the estimated ring strain (RS), the $\Delta\Delta H_{H2}$(RS) values for each reaction (Eq. S4). One may correct the ΔH_{H2}[I] values of penicillin conformers with the calculated $\Delta\Delta H_{H2}$(RS), yielding ΔH_{H2}(AM)* values (Eq. S5). The final step is to convert the ΔH_{H2}(AM)* to Amidicity %, using Eq. 6. The amidicity value is transformed to the resonance enthalpy [H_{RE}(AM); Eq. S7]. However, amidicity is not limited to the values between 0% and 100%. Some amide compounds exhibit extreme amidicity values, either below 0% or above 100%, and referring to the cases when the amide bond may be weaker than that in **II** or stronger than that in **I**, respectively.

$$\Delta H_{H2}(\mathrm{AM}) = H[\mathbf{VI}] - \{H[\mathbf{V}] + H(H_2)\} \quad \text{Eq. S1.}$$

$$\Delta H_{H2}(\mathrm{RS1}) = H[\mathbf{VIII}] - \{H[\mathbf{VII}] + H(H_2)\} \quad \text{Eq. S2.}$$

$$\Delta H_{H2}(\mathrm{RS2}) = H[\mathbf{X}] - \{H[\mathbf{IX}] + H(H_2)\} \quad \text{Eq. S3.}$$

$$\Delta\Delta H_{H2}(\mathrm{RS}) = \Delta H_{H2}(\mathrm{RS1}) - \Delta H_{H2}(\mathrm{RS2}) \quad \text{Eq. S4.}$$

$$\Delta H_{H2}(\mathrm{AM})^* = \Delta H_{H2}(\mathrm{AM}) + \Delta\Delta H_{H2}(\mathrm{RS}) \quad \text{Eq. S5.}$$

$$\mathrm{AM\ \%} = m_{AM}\, \Delta H_{H2}(\mathrm{AM})^* + b_{AM} \quad \text{Eq. S6.}$$

$$H_{RE}(\mathrm{AM}) = \mathrm{AM\ \%} / m_{AM} \quad \text{Eq. S7.}$$

Table S5. Calculated relative Gibbs free energies (ΔG) in kJ mol^{-1}, hydrogenation enthalpy [ΔH_{H2}(AM)] ring strained modified hydrogenation enthalpy [ΔH_{H2}(AM)*] in kJ mol^{-1}, amidicity values (%) and resonance enthalpy [H_{RE}(AM)] for the penicillin conformers in neutral (**2**) and in anionic (**1**) forms, computed at the B3LYP/6-31G(d,p) level of theory.

Conformers	ΔG (kJ mol^{-1})	ΔH_{H2}(AM) (kJ mol^{-1})	ΔH_{H2}(AM)* (kJ mol^{-1})	AM % (%)	H_{RE}(AM) (kJ mol^{-1})
c1 (2)	29.24	-36.69	-83.95	-49.5	-39.33
c2 (2)	26.08	-9.36	-56.63	-15.1	-12.01
c3 (2)	47.00	0.38	-46.88	-2.8	-2.26
c4 (2)	49.52	-4.66	-51.92	-9.2	-7.30
c5 (2)	24.06	-7.19	-54.46	-12.4	-9.84
c6 (2)	18.24	-14.46	-61.72	-21.5	-17.10
c7 (2)	1.29	12.45	-34.81	12.3	9.81
c8 (2)	5.99	-9.31	-56.58	-15.0	-11.96
c9 (2)	31.42	-26.37	-73.64	-36.5	-29.02
c10 (2)	0.00	16.32	-30.95	17.2	13.67
c1 (1)	56.04	26.18	-21.08	29.6	23.54
c5 (1)	44.18	36.46	-10.81	42.5	33.81
c6 (1)	7.71	39.95	-7.31	46.9	37.31
c10 (1)	0.00	43.82	-3.44	51.8	41.18

ΔE, ΔE_{ZPV}, ΔU, ΔH, ΔG values are expressed in kJ mol^{-1}; 1 Hartree = 2625.4997 kJ.mol^{-1}; ΔS values are expressed in: J mol^{-1} K)$^{-1}$; 1 cal = 4.184 J

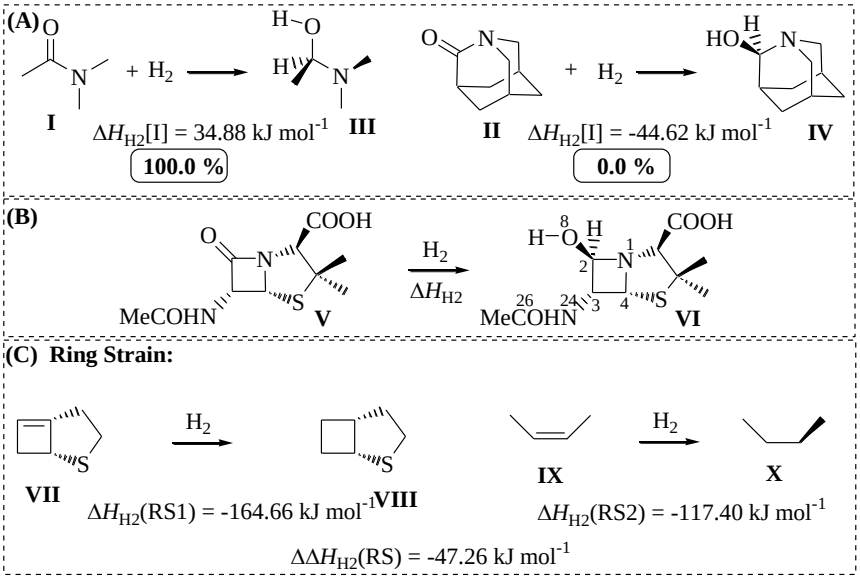


Fig. S7. The definition of the amidicity (**I**) and its application for penicillin (**II**) based on the enthalpy of hydrogenation (ΔH_{H2}) of the carbonyl group. Values were obtained from the B3LYP/6-31G(d,p) geometry-optimized structures. In structures of **II** and **III**, the O–C–X–R^3 and the H–O–C–X dihedral angles are forced into the *anti* orientation. The consideration of ring strain for amidictiy (**C**).

5. EPIMERIZATION OF THE C7 ATOM IN VALINE:

To find the explanation for this non-obvious epimerization, let us consider not only the original *L*,*D*,*D* configuration (**1** and **2**), but the other three, possible configurations of the penicillin [*L*,*D*,*L* (**6** and **7**); *L*,*L*,*L* (**8** and **9**) and *L*,*L*,*L* (**10** and **11**)] as well. Only the above four diastereomers listed, since enantiomers *D*,*X*,*Y* can be ignored in the present investigation, as they are the enantiomeric mirror image pairs of the four stereoisomers considered, consequently they are having the same properties. **Fig. S8** shows the results, in all the four cases, of the amidicity calculations, for both the neutral and anionic forms related to the deprotonation/protonation equilibrium (**1** → **2**).

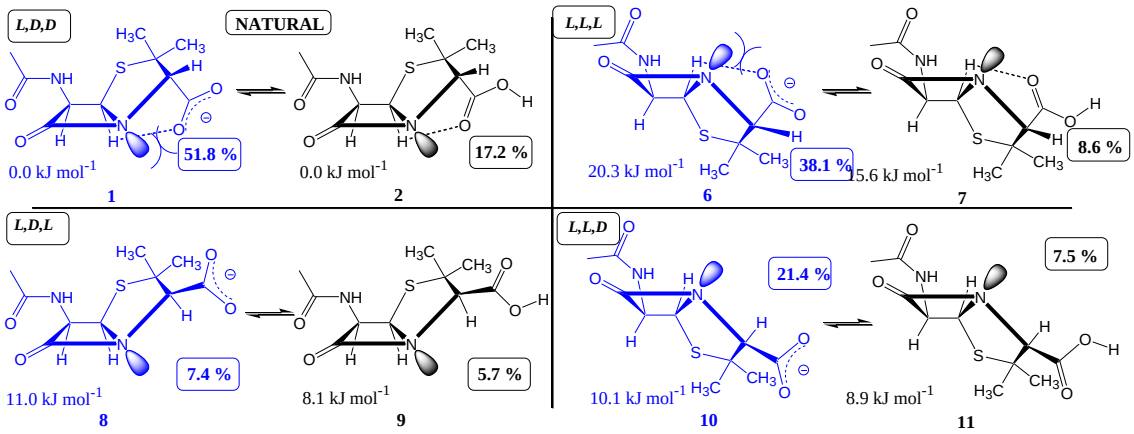


Fig. S8. Calculated amidicity values of penicillin stereoisomers (**1**, **6**, **8** and **10**) in their anionic and neutral forms (**2**, **7**, **9**, **11**).

The four configurations (**Fig. S8**) can be ranked into two classes. In the first group [*L*,*D*,*D* (**2**); *L*,*L*,*L* (**7**)], the amidicity change is significant during the equilibrium, while in the second group [*L*,*D*,*L* (**9**); *L*,*L*,*D* (**11**)], these changes are more moderate. In the first group, the COO^- and N atom lone pairs are on the same face of the molecule; in contrast the opposite is true for the second group. As **Fig. S8** shows, during deprotonation (**1** → **2**) the largest amidicity change can be observed for the natural configuration [*L*,*D*,*D* (**2**)], the other three non-natural configurations present smaller changes. The second largest changes in the amidicity value during the protonation equilibrium can be found in case of configuration *L*,*L*,*L*, but here two chiral centers should be epimerized compared to the

natural form. The *L*→*D* epimerization seems to be necessary for achieving the functionally best stereochemistry.

6. RING STRAIN

To estimate the ring strains for this system, measured in kJ mol^{-1}, the following Born-Haber cycles (**Fig. S9**), consisting of four isodesmic reactions, were investigated for conformers **1** as well as **2**. Note that the larger negative ring opening enthalpy value observed is corresponding to a higher ring strain. The amidicity value of an analogously substituted four-member lactam (**2**→**12**, **Fig. S9**) is 77 %, which is not reactive enough to be an acylating agent. The low amidicity value may be attributed to the relatively small (**12**→**16**; –31.40 kJ mol^{-1}) ring strain. In order to increase the reactivity, this amide bond is embedded into a strained fused four- and five-member ring system (**Fig. 2**), increasing the ring-strain of the four member ring (**2**→**13**; –73.71 kJ mol^{-1}), and decreasing significantly the amidicity value (17.2 %). The five-member ring does not possess high ring strain in itself (**2**→**12**; –23.56 kJ mol^{-1}), but in penicillin analogues behaves as a spring, forcing the four-member ring together with the amide bond to store significant amount of internal energy. For **1**, the ring strains obtained are a bit larger (**1**→**15**; –24.61 kJ mol^{-1} and **1**→**14**; –75.06 kJ mol^{-1}), which may be attributed to a internal, H-bond between the COO^- and H–C^3, forming a more rigid ring system.[1&] Thus, we have the lethal weapon of the nano-mousetrap.

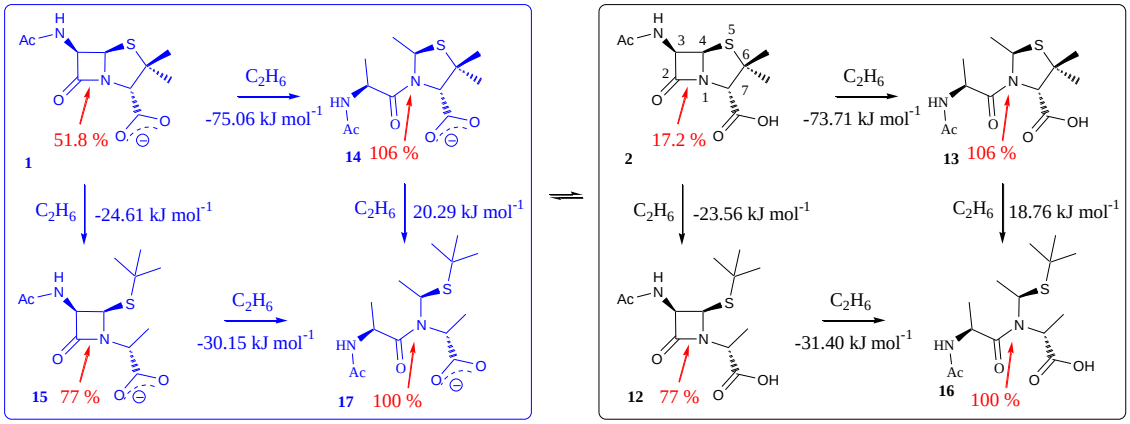


Fig. S9. A Born-Haber cycles of enthalpy of the four isodesmotic reactions for structures of **1** and **2**. The corresponding amidicity percentage values for each molecules are shown, as percentage, under each structure.

7. BIO- AND CHEMICAL SYNTHESIS OF PENICILLIN

During the biosynthesis (**Fig S10**), the amide bond is formed in the first step (**17**, Cys-Val protected dipeptide), followed by the necessary epimerization process (**18**). The final, fused ring system is put together in the latest state, by an enzyme catalyzed oxidative process. The energy demand of the very unfavorable ring closure is compensated by the very exothermic reduction of O_2 to water. In the last step, the carboxylic functionality is always in its deprotonated, namely in its self-defending form, to avoid the immediate hydrolysis or side-reaction with the enzyme side chain, resulting penicillin-N, as a bioprecursor (**19**). This precursor is finally transformed to the final derivative of penicillin (**2**).

Analogously, in the course of the chemical synthesis of penicillin,[22,23&] developed by Sheehan in 1957 (**Fig S10**), also constructs the ring system in the final stage (**23** → **24** → **2**), form **22**, where the amide bond is formed, by using dicyclohexylcarbodiimide (DCC).[23&] However, the formation of this amide linkage was successful only, if the intermediate **23** was transformed into its potassium salt (**24**).[23&] Finally, it was observed, that penicillin derivatives, especially penicillin-G, is also stable in its potassium salt and in most of the cases this drug product is formulated as a potassium

salt (**1**+K^+). All of these experimental observations are related the self-protecting feature of penicillin. The bio and chemical synthesis is compare in **Fig. S10**.

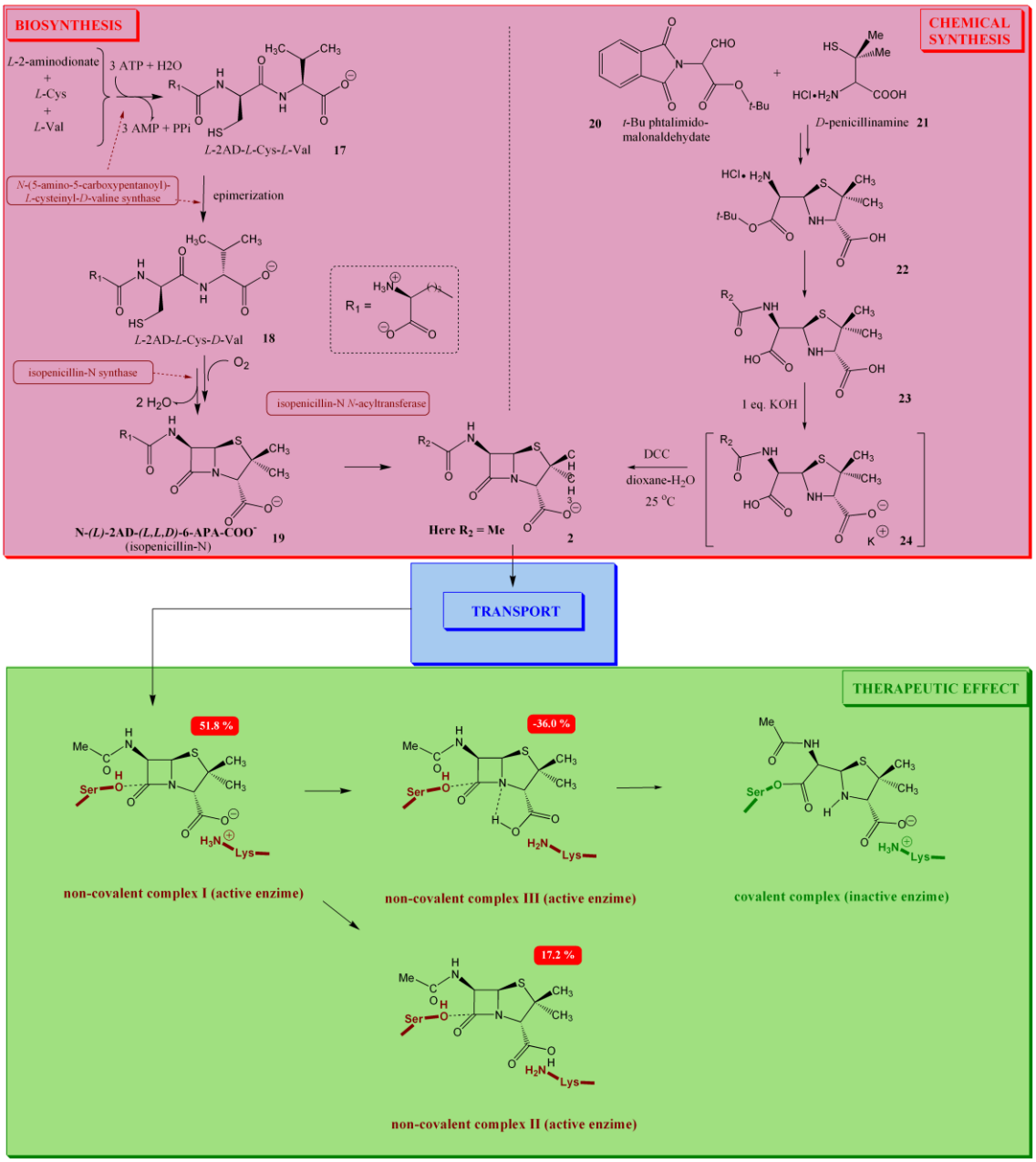


Fig. S10. Mechanism of biosynthesis and therapeutic molecular change of penicillin.

8. MODELLING OF THE ENZYMATIC MECHANISM OF PENICILLIN

Starting from the 3D docked structure consisting of **2** and 1HVB, we have extended the minimal active site, including partly the side chain of 9 amino acid resides resides (Gly61, Ser62, Val63, Lys65, Tyr157, Tyr159, Asn161, Arg298, His298), 4 water molecules and **2** (including 154 atoms). The remaining part of the enzyme complex was neglected. To keep the original arrangement, 9 atomic distances (red lines in **Fig. S11**) were frozen, forming a holding web around the cut of the super molecular complex. After optimization at the B3LYP/6-31G(d,p) level of theory, the structure obtained is very close to the corresponding part of the docked complex.

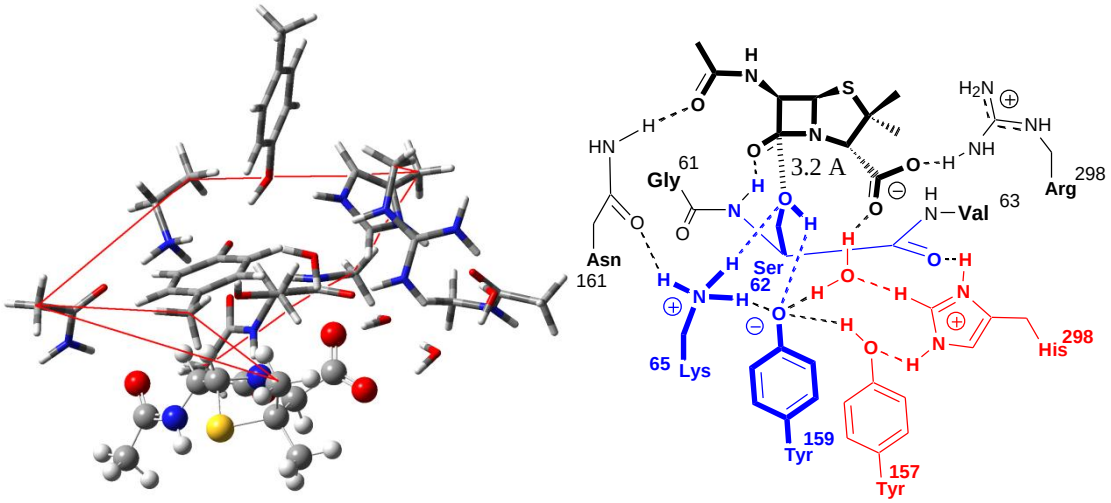


Fig. S11. 3D molecular structure for modelling of the enzymatic mechanism of penicillin (left side) and its chemical sketch (right side).

10. RAW DATA

10.1. Computed energies

Table S6. Total energies (*E*), zero point corrected energies (E_{ZPE}), internal energies (*U*), enthalpies (*H*) and Gibbs free energies (*G*) in hartree and entropies (*S*) in cal mol^{-1} K^{-1} for the compounds examined, computed at the B3LYP/6-31G(d,p) level of theory.

Conformers	Comp.	E	E_{ZPE}	U	H	G	S
c1	**2**	-1198.10834540	-1197.864635	-1197.847296	-1197.846352	-1197.910472	134.952
c2	**2**	-1198.10958764	-1197.865662	-1197.848210	-1197.847266	-1197.911679	135.570
c3	**2**	-1198.10195369	-1197.858142	-1197.840730	-1197.839786	-1197.903703	134.525
c4	**2**	-1198.10036844	-1197.856800	-1197.839284	-1197.838339	-1197.902743	135.549
c5	**2**	-1198.11048938	-1197.866562	-1197.849117	-1197.848173	-1197.912450	135.284
c6	**2**	-1198.11286478	-1197.869208	-1197.852656	-1197.851712	-1197.914668	132.502
c7	**2**	-1198.11804034	-1197.874102	-1197.856552	-1197.855608	-1197.921129	137.900
c8	**2**	-1198.11722247	-1197.873118	-1197.855780	-1197.854835	-1197.919336	135.752
c9	**2**	-1198.10762963	-1197.864289	-1197.847499	-1197.846554	-1197.909642	132.780
c10	**2**	-1198.11873463	-1197.874786	-1197.857256	-1197.856312	-1197.921621	137.455
c1	**1**	-1197.54682096	-1197.316516	-1197.299209	-1197.298265	-1197.362843	135.917
c5	**1**	-1197.55205668	-1197.321719	-1197.304486	-1197.303542	-1197.367362	134.321
c6	**1**	-1197.56534886	-1197.334610	-1197.317327	-1197.316383	-1197.381269	136.565
c10	**1**	-1197.56856186	-1197.337896	-1197.320659	-1197.319715	-1197.384207	135.735

Table S7. Total energies (*E*), zero point corrected energies (E_{ZPE}), internal energies (*U*), enthalpies (*H*) and Gibbs free energies (*G*) in hartree and entropies (*S*) in cal mol^{-1} K^{-1} for the compounds examined, computed at the B3LYP/6-31G(d,p) level of theory.

Conformers	Comp.	E	E_{ZPE}	U	H	G	S
c1	**2**	-1199.31148825	-1199.044070	-1199.026342	-1199.025397	-1199.090302	136.603
c2	**2**	-1199.30157321	-1199.035063	-1199.016837	-1199.015893	-1199.083088	141.423
c3	**2**	-1199.29079233	-1199.023514	-1199.005643	-1199.004698	-1199.069541	136.473
c4	**2**	-1199.29049042	-1199.024465	-1199.006117	-1199.005173	-1199.072644	142.006
c5	**2**	-1199.30165161	-1199.035143	-1199.016919	-1199.015974	-1199.083139	141.361
c6	**2**	-1199.30821429	-1199.041252	-1199.023225	-1199.022281	-1199.088521	139.414
c7	**2**	-1199.30161251	-1199.035084	-1199.016862	-1199.015918	-1199.083175	141.554
c8	**2**	-1199.30847592	-1199.041499	-1199.024387	-1199.023443	-1199.087083	133.943
c9	**2**	-1199.30843433	-1199.041350	-1199.023398	-1199.022454	-1199.088313	138.613
c10	**2**	-1199.30181379	-1199.035253	-1199.017041	-1199.016097	-1199.083407	141.665
c1	**1**	-1198.72490999					
c5	**1**	-1198.72685345	-1198.473495	-1198.455645	-1198.454701	-1198.519785	136.982
c6	**1**	-1198.73819099	-1198.485148	-1198.467154	-1198.466210	-1198.532706	139.952
c10	**1**	-1198.73986724	-1198.486911	-1198.469011	-1198.468067	-1198.533795	138.336

Table S8. Total energies (*E*), zero point corrected energies (E_{ZPE}), internal energies (*U*), enthalpies (*H*) and Gibbs free energies (*G*) in hartree and entropies (*S*) in cal mol^{-1} K^{-1} for the compounds examined, computed at the MP2(full)/DZVP level of theory.

Comp.	E	E_{ZPE}	U	H	G	S
I	-286.017285794	-286.746551	-286.740265	-286.739320	-286.776488	78.226
II	-477.671051376	-478.972157	-478.964476	-478.963532	-479.004668	86.577
III	-287.146709860	-287.866158	-287.858467	-287.857523	-287.897112	83.322
IV	-478.826040300	-480.118739	-480.110756	-480.109812	-480.150817	86.303
VII	-630.022450	-630.022450	-630.016273	-630.015329	-630.052877	79.027
VIII	-630.444410394	-631.217180	-631.210897	-631.209953	-631.248169	80.431
IX	-156.090772156	-156.502628	-156.498420	-156.497475	-156.529109	66.580
X	-157.281064556	-157.679968	-157.674343	-157.673399	-157.707922	72.661
H_2	-1.144496371	-1.134155	-1.131794	-1.130850	-1.145623	31.093
5	-245.803036745	-246.441988	-246.437263	-246.436319	-246.469729	70.317
5+H_2	-246.930766797	-247.557675	-247.552599	-247.551654	-247.585531	71.300
cyclobutane	-154.884374351	-155.311710	-155.307867	-155.306923	-155.336711	62.694
cyclobutene	-156.079715523	-156.493711	-156.489682	-156.488738	-156.519730	65.229

Table S9. Total energies (*E*), zero point corrected energies (E_{ZPE}), internal energies (*U*), enthalpies (*H*) and Gibbs free energies (*G*) in hartree and entropies (*S*) in cal mol^{-1} K^{-1} for the compounds examined, computed at the MP2(full)/DZVP level of theory.

Comp.	E	E_{ZPE}	U	H	G	S
1	-1425.401607254	-1424.572967	-1424.551993	-1424.551048	-1424.624180	153.918
1+H_2	-1426.554906968	-1425.681295	-1425.659443	-1425.658499	-1425.735778	162.646
2	-1422.161796950	-1425.081283	-1425.060054	-1425.059110	-1425.132692	154.867
2+H_2	-1423.299047470	-1426.205082	-1426.183950	-1426.183006	-1426.256512	154.706
3	-1422.153756030	-1425.074428	-1425.053284	-1425.052339	-1425.126869	156.860
3+H_2	-1423.294739530	-1426.204033	-1426.183303	-1426.182359	-1426.254270	151.350

Table S10. Total energies (*E*), of the enzyme mechanism, computed at the HF/3-21G* B3LYP/6-31G(d,p)// HF/3-21G* levels of theory.

Conformers	E (HF/3-21G*)	E (B3LYP/6-31G(d,p)//HF/3-21*)
A	-3829.685644530	-3872.349257720
TS(A->B)	-3829.722243844*	-3872.375944720*
B	-3829.656338620	-3872.330448520
TS(B->C)	-3829.627630830	-3872.295418410
C	-3829.646033360	-3872.305565410
TS(C->D)	-3829.635058770	-3872.297248050
D	-3829.654763859	-3872.316470835

*Not completely optimized structure

10.2. XYZ coordinates

cyclobutene (MP2full/DVZP)

C	-0.00258300	0.67889000	0.81704900
C	0.00258300	-0.67889000	0.81704900
C	0.00258300	-0.78742600	-0.70351600
C	-0.00258300	0.78742600	-0.70351600
H	-0.00546800	1.42949900	1.61031400
H	0.00546800	-1.42949900	1.61031400
H	-0.89148700	-1.24722500	-1.14545300
H	0.89915900	-1.24163000	-1.14606000
H	-0.89915900	1.24163000	-1.14606000
H	0.89148700	1.24722500	-1.14545300

cyclobutane (MP2full/DVZP)

C	0.75232400	0.77569500	0.14601100
C	0.77569000	-0.75233000	-0.14601100
C	-0.75231900	-0.77567600	0.14600900
C	-0.77568400	0.75231100	-0.14600900
H	0.94596400	0.97535500	1.20789500
H	1.38726800	1.43033800	-0.46442300
H	1.43035300	-1.38725200	0.46442300
H	0.97534400	-0.94597500	-1.20789500
H	-0.94601100	-0.97539100	1.20787800
H	-1.38725200	-1.43034200	-0.46442200
H	-1.43033700	1.38725600	0.46442300
H	-0.97539300	0.94601100	-1.20787800

butane (MP2full/DVZP)

C	-0.67570700	0.71091500	0.00001100
C	0.67570800	0.71091500	0.00001800

H	-1.19388100	1.67185200	0.00003800
H	1.19388200	1.67185200	0.00005300
C	-1.51472200	-0.54806600	-0.00002600
H	-1.30627800	-1.16713600	0.88401800
H	-2.58527700	-0.31479000	0.00005000
H	-1.30638000	-1.16701900	-0.88417600
C	1.51472200	-0.54806600	0.00000000
H	1.30608700	-1.16723000	-0.88393200
H	2.58527600	-0.31479000	-0.00032800
H	1.30657000	-1.16692600	0.88426200

butane (MP2full/DVZP)

C	1.56755100	-0.56435300	-0.12411200
C	0.70527100	0.63114100	0.30488800
H	2.58726200	-0.47454900	0.27287400
H	1.15608100	-1.51429100	0.23784900
H	1.63764800	-0.62213100	-1.21920500
C	-0.70523500	0.63112200	-0.30485300
H	0.62360300	0.64872400	1.40248600
H	1.21532500	1.56146900	0.01498100
C	-1.56757600	-0.56433500	0.12410600
H	-1.21533800	1.56149000	-0.01512200
H	-0.62356600	0.64873500	-1.40246700
H	-2.58721100	-0.47459400	-0.27307800
H	-1.15599400	-1.51428600	-0.23769200
H	-1.63787400	-0.62201300	1.21919300

VII (MP2full/DVZP)

C	1.62232100	0.55312900	-0.43133000
C	0.71967300	1.56621000	0.32839700
C	-0.59064800	0.85898900	0.30479900
C	-0.56396200	-0.61590700	0.61732000
C	-1.77453500	0.80821900	-0.36519000

C	-1.90840700	-0.70681300	-0.20162300
H	1.54613100	0.73408500	-1.51065400
H	0.70248000	2.53660400	-0.18337700
H	-2.35459200	1.55151100	-0.91659900
H	-2.77997500	-1.09087700	0.34720900
H	1.07778600	1.69908200	1.35863500
H	2.67288600	0.63011500	-0.12452800
S	1.03407900	-1.16772600	-0.06353000
H	-1.78325900	-1.25877200	-1.14267400
H	-0.65337900	-0.90109700	1.67423500

VIII (MP2full/DVZP)

C	1.41621200	0.66402000	-0.61603600
C	0.60630500	1.55310100	0.33916500
C	-0.69877200	0.81449100	0.62095600
C	-0.45577800	-0.73120900	0.66987100
C	-1.67536000	0.59576500	-0.57381000
C	-1.65945200	-0.93581500	-0.29433100
H	1.06012400	0.75169900	-1.65050500
H	0.42519700	2.54437800	-0.10341700
H	-1.22714700	0.85771400	-1.54087900
H	-2.55545200	-1.26603600	0.24847700
H	1.16678000	1.68327400	1.27538600
H	2.48563500	0.91044600	-0.59631600
S	1.20754300	-1.04435200	-0.00212500
H	-1.48823600	-1.60084500	-1.14960900
H	-0.52688500	-1.21975700	1.65097800
H	-1.20985600	1.19246300	1.51775500
H	-2.64976900	1.09417300	-0.49277400

1 (MP2full/DVZP)

N	1.66952100	-1.00934200	0.65938300
C	0.42896300	-1.32880500	1.18136600
C	0.03479200	-2.10262100	-0.11043300

C	1.36017200	-1.50573300	-0.68522000
S	1.24776100	-0.00382300	-1.72780400
C	1.81483700	1.14018400	-0.37449800
C	2.44807200	0.22197800	0.72732100
O	-0.15206000	-1.03084600	2.22334900
H	0.01182000	-3.19428200	-0.02479400
H	2.11034500	-2.18952800	-1.09238000
C	2.82503100	2.12788600	-0.96809300
H	3.66326100	1.59912000	-1.43410600
H	2.33398800	2.76471900	-1.71936800
H	3.22642800	2.76342600	-0.16747700
C	0.59639000	1.88853000	0.18781700
H	-0.11721500	1.20614500	0.66489000
H	0.06725000	2.42909100	-0.60993500
H	0.92890100	2.61795600	0.94341300
H	2.29846100	0.67752800	1.71524400
C	3.96585000	-0.04642000	0.47659700
O	4.21205700	-1.00652800	-0.31524600
O	4.73846300	0.76890200	1.06201900
N	-1.18055900	-1.61933800	-0.72181500
H	-1.11988400	-0.66106800	-1.07475400
C	-2.40984800	-2.09536400	-0.34946600
O	-2.58720700	-3.17856900	0.22794100
C	-3.56301100	-1.15946000	-0.72052400
H	-4.46693000	-1.57942300	-0.26241300
H	-3.69620600	-1.16446800	-1.81238200
C	-3.29898000	0.24902700	-0.22746900
C	-2.97556800	0.45954700	1.12950800
C	-3.33098500	1.35314700	-1.09832400
C	-2.70693900	1.75057600	1.60383400
H	-2.90130600	-0.39185100	1.80899000
C	-3.06567300	2.64949200	-0.62296500
H	-3.56064400	1.19899600	-2.15526600
C	-2.75623600	2.85134200	0.73061200
H	-2.43496700	1.89222700	2.65069600
H	-3.08900000	3.49589700	-1.31164500

H	-2.53242100	3.85392800	1.09830500

1+H2 (MP2full/DVZP)

N	1.89346500	-1.15027300	0.33371800
C	0.72675900	-1.40297100	1.17330300
C	-0.06407800	-1.77468100	-0.10532600
C	1.06580400	-1.02591300	-0.86417200
S	0.72019700	0.78019500	-1.09603600
C	2.04193900	1.32173300	0.07948500
C	2.77665400	-0.00150100	0.53919500
H	-0.05324700	-2.85735500	-0.26546600
H	1.49248400	-1.43755500	-1.78362500
C	2.97990600	2.29105600	-0.66054500
H	3.39409200	1.81821200	-1.55698600
H	2.42963900	3.19925700	-0.94970700
H	3.81287600	2.57124800	-0.00127400
C	1.41721200	2.06854200	1.27316900
H	0.72553200	1.44105800	1.84682600
H	0.86626900	2.95823800	0.93290500
H	2.21961100	2.40131100	1.94876600
H	3.01560200	0.06218600	1.61083500
C	4.09333000	-0.19737100	-0.27736000
O	3.92455900	-0.68006300	-1.43952600
O	5.14473500	0.20937700	0.30326800
N	-1.41642700	-1.28411500	-0.21964400
H	-1.50115100	-0.26884600	-0.28303600
C	-2.49420000	-2.05911600	-0.53492300
O	-2.46955400	-3.29788800	-0.62402700
C	-3.80101000	-1.27795400	-0.68253000
H	-4.54419600	-1.77785000	-0.04902700
H	-4.15847600	-1.28920700	-1.72123600
O	0.98454800	-2.42065600	2.13448200
H	0.23140000	-2.42322900	2.75598900
H	0.29767100	-0.52002400	1.67939100
C	-3.58075600	0.14655100	-0.21843300

C	-3.34477300	0.41217100	1.14529300
C	-3.56301500	1.21536100	-1.13362700
C	-3.10077200	1.72266300	1.58225600
H	-3.33157000	-0.41864100	1.85290300
C	-3.32282900	2.52893300	-0.69691300
H	-3.74140400	1.02058300	-2.19356500
C	-3.09057300	2.78662600	0.66348200
H	-2.91733900	1.91463600	2.64076700
H	-3.31129700	3.34715600	-1.41880300
H	-2.90080200	3.80547700	1.00468300

2 (MP2full/DVZP)

N	1.72742800	-1.07043100	0.61740900
C	0.45356100	-1.37041000	1.14783400
C	0.03028800	-2.09353100	-0.15995600
C	1.35589100	-1.50801400	-0.74505400
S	1.28632200	0.00254500	-1.76975000
C	1.72485300	1.14363500	-0.37858700
C	2.36642300	0.22842900	0.72253100
O	-0.08033600	-1.04861700	2.19442900
H	0.00758600	-3.18660600	-0.08826300
H	2.05542700	-2.22372600	-1.19010300
C	2.68549100	2.21679700	-0.90669300
H	3.56737000	1.77841600	-1.38822700
H	2.17226800	2.84480300	-1.64667800
H	3.01533600	2.86264200	-0.08135100
C	0.45461000	1.80246200	0.18186000
H	-0.24278600	1.07404700	0.61074400
H	-0.07227000	2.33980500	-0.61661700
H	0.72072500	2.52294100	0.97034700
H	2.15701500	0.64629900	1.71627000
C	3.87313400	0.11754200	0.58599000
O	4.22482000	-0.84262900	-0.31236500
O	4.67611800	0.82117900	1.18147100
N	-1.18863700	-1.60676400	-0.74572200

H	-1.16753100	-0.64031100	-1.07522900
C	-2.40305200	-2.10731100	-0.31218800
O	-2.50553900	-3.17819600	0.29458900
C	-3.58984100	-1.21259700	-0.65836100
H	-3.76130300	-1.24847100	-1.74390400
H	-4.46565000	-1.64196400	-0.15748800
H	5.20844500	-0.83433300	-0.35566100
C	-3.33567400	0.21139200	-0.20656400
C	-3.08814800	0.47255400	1.15751800
C	-3.31171800	1.28050700	-1.12074600
C	-2.83893400	1.78026100	1.59690600
H	-3.08469900	-0.35114900	1.87488100
C	-3.06588100	2.59330500	-0.68070000
H	-3.50241700	1.08989400	-2.17940300
C	-2.83108400	2.84613800	0.67953700
H	-2.65074200	1.96701800	2.65517500
H	-3.06511600	3.41501600	-1.39874500
H	-2.64435500	3.86447200	1.02348900

2+H2 (MP2full/DVZP)

N	-2.01371100	1.13901000	0.19954500
C	-1.01052400	1.80980300	1.03285200
C	-0.08319700	1.96191500	-0.20578600
C	-1.10763600	1.05983100	-0.96665300
S	-0.65593300	-0.69092200	-1.24863100
C	-1.58422600	-1.31768600	0.21300000
C	-2.56357400	-0.14735300	0.59648400
H	-0.03493700	2.99783200	-0.55975200
H	-1.52929600	1.46460700	-1.89513000
C	-2.32023200	-2.60787300	-0.18420700
H	-2.95607500	-2.46063300	-1.06437500
H	-1.59178600	-3.39434900	-0.42211800
H	-2.94121100	-2.96045800	0.65132200
C	-0.61895400	-1.63551000	1.36904200

H	-0.02734000	-0.76690600	1.67757700
H	0.09034700	-2.41332100	1.05712700
H	-1.18074700	-2.00408200	2.24072400
H	-2.73298500	-0.14837700	1.68224000
C	-3.92858400	-0.33072900	-0.04470000
O	-3.92777900	0.07402700	-1.34368000
O	-4.90736100	-0.80230800	0.51847700
N	1.24602600	1.43452800	-0.05956800
H	1.32308500	0.41605600	-0.07885600
C	2.37472400	2.15104300	-0.38513600
O	2.37002400	3.36580200	-0.61830900
C	3.67457600	1.33367600	-0.39577900
H	4.33948000	1.80423000	0.34134800
H	4.12966900	1.49949700	-1.38177400
O	-1.57006700	2.98693400	1.58631600
H	-0.89849600	3.39107100	2.17102600
H	-0.56732800	1.18997000	1.82972500
H	-4.84108400	-0.07628600	-1.67829600
C	3.49524300	-0.13717900	-0.11279000
C	3.52570900	-0.62226200	1.21016100
C	3.21208900	-1.03922500	-1.15717200
C	3.27660000	-1.97609200	1.48395200
H	3.74377900	0.06740900	2.02879300
C	2.96245700	-2.39430100	-0.88815500
H	3.17877700	-0.67618900	-2.18685800
C	2.99286700	-2.86617700	0.43397700
H	3.31006800	-2.33788400	2.51277300
H	2.74615000	-3.07897800	-1.70934000
H	2.80608700	-3.92015600	0.64513500

3 (MP2full/DVZP)

N	1.84416000	-1.09397600	0.46877400
C	0.59711700	-1.48470700	1.04674500
C	0.08939500	-2.05532400	-0.30373800

C	1.37204400	-1.40430100	-0.91267400
S	1.26894000	0.17618800	-1.79907600
C	1.66307200	1.20417300	-0.30990800
C	2.42518600	0.23717700	0.65597600
O	0.14725100	-1.29851900	2.15874800
H	0.07121500	-3.15095800	-0.34161200
H	2.02921700	-2.09027600	-1.46217800
C	2.45733600	2.42499200	-0.79364100
H	3.35280900	2.14733500	-1.35616300
H	1.81098600	3.03538000	-1.43927300
H	2.76400100	3.03659500	0.06341900
C	0.36498800	1.68201600	0.36333200
H	-0.25245100	0.86268900	0.74736400
H	-0.24093400	2.24686000	-0.35568600
H	0.60638500	2.34441700	1.20846800
H	2.23139900	0.54274800	1.69573200
C	3.95632300	0.18571800	0.49876400
O	4.47626200	-1.05752000	0.34352500
O	4.66083300	1.17816500	0.55647800
N	-1.16352900	-1.52712200	-0.75809000
H	-1.18108300	-0.53978100	-1.01655000
C	-2.34919400	-2.12471900	-0.37165200
O	-2.39198600	-3.25523900	0.12331300
C	-3.58310900	-1.26447000	-0.62988500
H	-3.80510600	-1.28526300	-1.70667900
H	-4.41507600	-1.74527100	-0.10175400
H	3.73001800	-1.69578500	0.44005000
C	-3.37223500	0.15786000	-0.15554900
C	-3.14539700	0.40619100	1.21439200
C	-3.36660400	1.24030700	-1.05439000
C	-2.93099900	1.71297500	1.67478400
H	-3.13519700	-0.42806500	1.91996600
C	-3.15669100	2.55228700	-0.59367500
H	-3.54477400	1.06057400	-2.11711600
C	-2.94009000	2.79128800	0.77208400
H	-2.76155500	1.89079700	2.73777000

H	-3.17149000	3.38404400	-1.29973600
H	-2.78155200	3.80877200	1.13210800

3+H2 (MP2full/DVZP)

N	-2.10278200	1.01078100	0.16092400
C	-1.18193200	1.81518500	0.98244700
C	-0.21125900	1.96931900	-0.22450300
C	-1.18785200	1.04534700	-1.02012000
S	-0.70879700	-0.65027500	-1.43300800
C	-1.40389900	-1.37367700	0.11532200
C	-2.49254400	-0.34264600	0.56868300
H	-0.16404900	3.00675800	-0.57585500
H	-1.63689500	1.50975500	-1.90908600
C	-1.91516600	-2.77946900	-0.23637200
H	-2.63844500	-2.76681200	-1.05625600
H	-1.05975900	-3.40364200	-0.53111200
H	-2.39367100	-3.23772700	0.63719700
C	-0.31438500	-1.51268500	1.19435600
H	0.12442400	-0.55514200	1.49483300
H	0.50209900	-2.14456800	0.82285400
H	-0.74068200	-1.98851400	2.09057100
H	-2.56514500	-0.36425900	1.66735600
C	-3.92819500	-0.62423100	0.06607800
O	-4.51706800	0.42752200	-0.54039300
O	-4.50140300	-1.68582200	0.25489100
N	1.12296400	1.46696500	-0.03702200
H	1.23973700	0.45615300	-0.12976300
C	2.23194900	2.23213500	-0.33660600
O	2.18207900	3.45324000	-0.52180200
C	3.55746000	1.46313800	-0.38083600
H	4.22498400	1.96266900	0.33412300
H	3.97770000	1.64380600	-1.38000300
O	-1.86207500	2.98214200	1.40480000
H	-1.24725900	3.51216500	1.95072100

H	-0.75027300	1.28097500	1.84303700
C	3.45433500	-0.01449500	-0.09177400
C	3.59683500	-0.50099200	1.22321900
C	3.16837100	-0.92974400	-1.12444000
C	3.46759500	-1.87097900	1.49919400
H	3.81843600	0.19836400	2.03255200
C	3.03586900	-2.30103600	-0.85234400
H	3.05319000	-0.56825100	-2.14872500
C	3.18897600	-2.77573800	0.46037700
H	3.59197100	-2.23375800	2.52054900
H	2.82386000	-2.99649000	-1.66569300
H	3.09797500	-3.84198900	0.67250700
H	-3.86793400	1.17743700	-0.44504900

Inactive Michael-Complex-1 (A)

C	-1.49012800	-3.38493300	-4.05198800
C	-0.24226700	-2.64549300	-3.61262800
O	0.60241600	-2.22346900	-4.40260500
H	-2.37455000	-3.06021200	-3.52110600
H	-1.35266600	-4.44484400	-3.86003600
N	-0.10292900	-2.49147800	-2.28023800
C	1.00363000	-1.73477600	-1.70065300
C	2.27778000	-2.59020800	-1.56493300
O	2.77950500	-2.84147500	-0.45529800
C	0.61569900	-1.26140500	-0.30557300
O	-0.72274100	-0.70469100	-0.23708000
H	-0.75892100	-2.90442900	-1.64398900
H	1.25566700	-0.90773600	-2.34547200
H	0.60617100	-2.12072600	0.33933700
H	1.32936700	-0.54774900	0.06293300
H	-0.77911400	0.28325500	-0.18205100
N	2.79928700	-3.01574500	-2.70361900
C	4.06663600	-3.75630900	-2.74080500
H	4.00190300	-4.64396500	-2.12703200
H	2.34962700	-2.74644700	-3.56019400
C	0.10475300	2.24131500	-3.39645700
C	-1.37923100	1.90191800	-3.60506600
N	-1.92296300	1.04019200	-2.46971700
H	0.26156600	2.79131000	-2.48019800
H	0.43848600	2.85261600	-4.22629400
H	-1.98284200	2.79676000	-3.61482400
H	-1.53506000	1.35728100	-4.52396600
H	-2.93775100	0.89009800	-2.55961500
H	-1.46910000	0.13246200	-2.43072000
H	-1.72785300	1.48891200	-1.52924300
C	-5.49571100	2.75443400	3.73802300
C	-4.38801000	2.51991500	2.72838700
C	-3.05390300	2.65456800	3.09621900
C	-4.65690200	2.18533000	1.41272200

C	-2.03577700	2.45085400	2.19025500
C	-3.63959700	1.97720400	0.49151600
C	-2.30913900	2.10074600	0.86887300
O	-1.27442600	1.88805300	-0.02271800
H	-5.52646300	3.79649200	4.03896700
H	-5.34418500	2.15432100	4.62883100
H	-2.80892300	2.92713200	4.10521700
H	-5.67698600	2.09191100	1.08991500
H	-1.01752700	2.55893900	2.49691600
H	-3.90506100	1.71666800	-0.51208400
C	-6.97535400	1.52905000	-2.97616700
C	-5.85752500	0.49997100	-2.99942100
H	-7.80203500	1.15167300	-2.38512500
H	-7.33119500	1.72290300	-3.98067400
O	-4.75280300	0.68995700	-2.46388700
N	-6.16102500	-0.63909400	-3.61732000
H	-7.04422200	-0.77069800	-4.05966800
H	-5.53131900	-1.42290200	-3.56275200
C	-1.01605400	9.26171700	-0.15906800
C	-0.62938800	7.79566100	-0.21086100
C	-1.58124400	6.79751700	-0.32131100
C	0.70589700	7.41517400	-0.13909600
C	-1.22061600	5.46092000	-0.36856100
C	1.07562300	6.08748900	-0.18076500
C	0.11084500	5.10183500	-0.30152200
O	0.51919800	3.78121400	-0.36435600
H	-2.09045100	9.38201400	-0.22238800
H	-0.56807400	9.80878200	-0.98197600
H	-2.62051300	7.05884400	-0.36799900
H	1.46492200	8.16774600	-0.04306300
H	-1.97590700	4.70487100	-0.43944200
H	2.10370600	5.80158500	-0.10651800
H	-0.21558200	3.11876500	-0.24923400
C	3.98606800	3.73072300	-1.49448900
N	3.39126200	3.28680700	-0.22954500
C	4.09193300	2.64635700	0.70595800

N	5.41762200	2.62821900	0.65693400
N	3.46174000	2.01820800	1.68261100
H	3.18287900	4.09798800	-2.11464500
H	4.46824700	2.90789900	-2.00222900
H	5.90456300	3.14947900	-0.03624800
H	5.96537700	2.04266600	1.29874700
C	7.03281800	-0.53673900	-3.17940400
C	5.73062500	-0.29731100	-2.48817000
H	6.95730900	-0.25859600	-4.22237800
H	7.31835100	-1.58258400	-3.12803100
N	5.53875900	-0.56388800	-1.14623500
C	4.54362000	0.17924600	-2.93809400
C	4.25958600	-0.22878600	-0.84038600
N	3.61959000	0.21878500	-1.88857900
H	4.28842100	0.48614700	-3.92434100
H	3.85599900	-0.35225000	0.13283800
H	6.19916100	-0.96273700	-0.49638400
O	0.85048700	1.29397900	1.65643200
H	0.17191800	1.61095500	1.03577400
H	0.47256700	0.61050700	2.22874900
O	6.68668300	0.83009100	2.25432300
H	5.93964800	0.45017700	2.76773900
H	7.00789700	0.14028300	1.64896300
O	2.76100800	-1.60183600	1.98796500
H	2.81444300	-2.13567200	1.16614800
H	1.83907700	-1.46448800	2.24129200
O	4.45289500	-0.15448900	3.33520200
H	4.22682000	-0.17337900	4.27271100
N	-2.82024200	-2.04491300	1.46878700
C	-2.73820600	-2.70504500	0.25457300
C	-4.15172600	-2.23474500	-0.15836500
H	-4.15711900	-1.44857300	-0.89613300
C	-4.26490300	-1.70178900	1.31578600
H	-4.48508400	-0.65689700	1.41160000
S	-5.06652600	-2.73827700	2.56613600
C	-3.62160300	-2.49264600	3.70623000

C	-2.38067500	-2.55544800	2.75350200
H	-2.08219600	-3.59251100	2.63593800
O	-1.90332700	-3.45511100	-0.17766600
C	-3.74513300	-1.12610400	4.40903300
H	-4.67888000	-1.08902600	4.95429300
H	-3.72802800	-0.30366500	3.70496800
H	-2.92849100	-1.00186600	5.10595500
C	-3.55803900	-3.62018200	4.74711400
H	-3.54608100	-4.59402200	4.27271800
H	-4.40833100	-3.56870700	5.41554400
H	-2.65195200	-3.49500500	5.32646100
N	-5.01411900	-3.31369700	-0.55641300
H	-5.35245000	-3.92721600	0.15612400
C	-5.21052600	-3.60904400	-1.86008600
C	-6.06522100	-4.82643400	-2.11875500
H	-7.02092200	-4.73434900	-1.61689000
H	-5.56552800	-5.71346500	-1.74516900
H	-6.21878300	-4.92940200	-3.18111600
O	-4.71506200	-2.92580300	-2.75534900
C	-1.16691100	-1.80812100	3.27758500
O	-0.50537700	-1.07349200	2.36258700
O	-0.77239700	-1.91143400	4.40666600
H	2.38596500	3.33713200	-0.15771200
H	3.96682700	1.48499700	2.36827800
H	3.85924200	-0.76551500	2.81428600
H	-1.61766100	-3.24366300	-5.11428400
H	4.25890300	-4.04342500	-3.76350100
H	4.87457700	-3.13494000	-2.38453300
H	-6.46261000	2.49881200	3.32180000
H	0.71353500	1.34508600	-3.37614600
H	4.69026500	4.54095600	-1.34326700
H	-0.68216500	9.71583500	0.76787500
H	7.82775600	0.04754600	-2.72798100
H	2.45366800	1.87042100	1.66470700
H	-6.61234600	2.44519300	-2.53810500
N	6.71769200	-3.67682900	1.67601000

C	7.19825800	-2.44713900	1.83424600
H	6.83062500	-4.34699500	2.40457000
O	7.08881300	-1.58042100	0.95199600
C	6.01860200	-4.08727600	0.44951300
H	5.82430100	-5.14760300	0.51269600
H	5.08109600	-3.56302100	0.32981500
H	6.64333300	-3.89419600	-0.41167900
C	7.91381000	-2.14873700	3.13206300
H	7.52530600	-2.73425300	3.95329800
H	8.96937600	-2.37016800	3.01209600
H	7.81008500	-1.09564000	3.34362500
H	-0.90564800	-1.00565300	1.45427000

Superactive Michael-Complex-3 (B)

C	-1.49012800	-3.38493300	-4.05198800
C	-0.24226700	-2.64549300	-3.61262800
O	0.60241600	-2.22346900	-4.40260500
H	-2.37455000	-3.06021200	-3.52110600
H	-1.35266600	-4.44484400	-3.86003600
N	-0.10292900	-2.49147800	-2.28023800
C	1.00363000	-1.73477600	-1.70065300
C	2.27778000	-2.59020800	-1.56493300
O	2.77950500	-2.84147500	-0.45529800
C	0.61569900	-1.26140500	-0.30557300
O	-0.72274100	-0.70469100	-0.23708000
H	-0.75892100	-2.90442900	-1.64398900
H	1.25566700	-0.90773600	-2.34547200
H	0.60617100	-2.12072600	0.33933700
H	1.32936700	-0.54774900	0.06293300
H	-0.77911400	0.28325500	-0.18205100
N	2.79928700	-3.01574500	-2.70361900
C	4.06663600	-3.75630900	-2.74080500
H	4.00190300	-4.64396500	-2.12703200
H	2.34962700	-2.74644700	-3.56019400
C	0.10475300	2.24131500	-3.39645700

C	-1.37923100	1.90191800	-3.60506600
N	-1.92296300	1.04019200	-2.46971700
H	0.26156600	2.79131000	-2.48019800
H	0.43848600	2.85261600	-4.22629400
H	-1.98284200	2.79676000	-3.61482400
H	-1.53506000	1.35728100	-4.52396600
H	-2.93775100	0.89009800	-2.55961500
H	-1.46910000	0.13246200	-2.43072000
H	-1.72785300	1.48891200	-1.52924300
C	-5.49571100	2.75443400	3.73802300
C	-4.38801000	2.51991500	2.72838700
C	-3.05390300	2.65456800	3.09621900
C	-4.65690200	2.18533000	1.41272200
C	-2.03577700	2.45085400	2.19025500
C	-3.63959700	1.97720400	0.49151600
C	-2.30913900	2.10074600	0.86887300
O	-1.27442600	1.88805300	-0.02271800
H	-5.52646300	3.79649200	4.03896700
H	-5.34418500	2.15432100	4.62883100
H	-2.80892300	2.92713200	4.10521700
H	-5.67698600	2.09191100	1.08991500
H	-1.01752700	2.55893900	2.49691600
H	-3.90506100	1.71666800	-0.51208400
C	-6.97535400	1.52905000	-2.97616700
C	-5.85752500	0.49997100	-2.99942100
H	-7.80203500	1.15167300	-2.38512500
H	-7.33119500	1.72290300	-3.98067400
O	-4.75280300	0.68995700	-2.46388700
N	-6.16102500	-0.63909400	-3.61732000
H	-7.04422200	-0.77069800	-4.05966800
H	-5.53131900	-1.42290200	-3.56275200
C	-1.01605400	9.26171700	-0.15906800
C	-0.62938800	7.79566100	-0.21086100
C	-1.58124400	6.79751700	-0.32131100
C	0.70589700	7.41517400	-0.13909600
C	-1.22061600	5.46092000	-0.36856100

C	1.07562300	6.08748900	-0.18076500
C	0.11084500	5.10183500	-0.30152200
O	0.51919800	3.78121400	-0.36435600
H	-2.09045100	9.38201400	-0.22238800
H	-0.56807400	9.80878200	-0.98197600
H	-2.62051300	7.05884400	-0.36799900
H	1.46492200	8.16774600	-0.04306300
H	-1.97590700	4.70487100	-0.43944200
H	2.10370600	5.80158500	-0.10651800
H	-0.21558200	3.11876500	-0.24923400
C	3.98606800	3.73072300	-1.49448900
N	3.39126200	3.28680700	-0.22954500
C	4.09193300	2.64635700	0.70595800
N	5.41762200	2.62821900	0.65693400
N	3.46174000	2.01820800	1.68261100
H	3.18287900	4.09798800	-2.11464500
H	4.46824700	2.90789900	-2.00222900
H	5.90456300	3.14947900	-0.03624800
H	5.96537700	2.04266600	1.29874700
C	7.03281800	-0.53673900	-3.17940400
C	5.73062500	-0.29731100	-2.48817000
H	6.95730900	-0.25859600	-4.22237800
H	7.31835100	-1.58258400	-3.12803100
N	5.53875900	-0.56388800	-1.14623500
C	4.54362000	0.17924600	-2.93809400
C	4.25958600	-0.22878600	-0.84038600
N	3.61959000	0.21878500	-1.88857900
H	4.28842100	0.48614700	-3.92434100
H	3.85599900	-0.35225000	0.13283800
H	6.19916100	-0.96273700	-0.49638400
O	0.85048700	1.29397900	1.65643200
H	0.17191800	1.61095500	1.03577400
H	0.47256700	0.61050700	2.22874900
O	6.68668300	0.83009100	2.25432300
H	5.93964800	0.45017700	2.76773900
H	7.00789700	0.14028300	1.64896300

O	2.76100800	-1.60183600	1.98796500
H	2.81444300	-2.13567200	1.16614800
H	1.83907700	-1.46448800	2.24129200
O	4.45289500	-0.15448900	3.33520200
H	4.22682000	-0.17337900	4.27271100
N	-2.82024200	-2.04491300	1.46878700
C	-2.73820600	-2.70504500	0.25457300
C	-4.15172600	-2.23474500	-0.15836500
H	-4.15711900	-1.44857300	-0.89613300
C	-4.26490300	-1.70178900	1.31578600
H	-4.48508400	-0.65689700	1.41160000
S	-5.06652600	-2.73827700	2.56613600
C	-3.62160300	-2.49264600	3.70623000
C	-2.38067500	-2.55544800	2.75350200
H	-2.08219600	-3.59251100	2.63593800
O	-1.90332700	-3.45511100	-0.17766600
C	-3.74513300	-1.12610400	4.40903300
H	-4.67888000	-1.08902600	4.95429300
H	-3.72802800	-0.30366500	3.70496800
H	-2.92849100	-1.00186600	5.10595500
C	-3.55803900	-3.62018200	4.74711400
H	-3.54608100	-4.59402200	4.27271800
H	-4.40833100	-3.56870700	5.41554400
H	-2.65195200	-3.49500500	5.32646100
N	-5.01411900	-3.31369700	-0.55641300
H	-5.35245000	-3.92721600	0.15612400
C	-5.21052600	-3.60904400	-1.86008600
C	-6.06522100	-4.82643400	-2.11875500
H	-7.02092200	-4.73434900	-1.61689000
H	-5.56552800	-5.71346500	-1.74516900
H	-6.21878300	-4.92940200	-3.18111600
O	-4.71506200	-2.92580300	-2.75534900
C	-1.16691100	-1.80812100	3.27758500
O	-0.50537700	-1.07349200	2.36258700
O	-0.77239700	-1.91143400	4.40666600
H	2.38596500	3.33713200	-0.15771200

H	3.96682700	1.48499700	2.36827800
H	3.85924200	-0.76551500	2.81428600
H	-1.61766100	-3.24366300	-5.11428400
H	4.25890300	-4.04342500	-3.76350100
H	4.87457700	-3.13494000	-2.38453300
H	-6.46261000	2.49881200	3.32180000
H	0.71353500	1.34508600	-3.37614600
H	4.69026500	4.54095600	-1.34326700
H	-0.68216500	9.71583500	0.76787500
H	7.82775600	0.04754600	-2.72798100
H	2.45366800	1.87042100	1.66470700
H	-6.61234600	2.44519300	-2.53810500
N	6.71769200	-3.67682900	1.67601000
C	7.19825800	-2.44713900	1.83424600
H	6.83062500	-4.34699500	2.40457000
O	7.08881300	-1.58042100	0.95199600
C	6.01860200	-4.08727600	0.44951300
H	5.82430100	-5.14760300	0.51269600
H	5.08109600	-3.56302100	0.32981500
H	6.64333300	-3.89419600	-0.41167900
C	7.91381000	-2.14873700	3.13206300
H	7.52530600	-2.73425300	3.95329800
H	8.96937600	-2.37016800	3.01209600
H	7.81008500	-1.09564000	3.34362500
H	-0.90564800	-1.00565300	1.45427000

TS(B–>C)

C	0.99948500	-2.22629600	4.95392100
C	-0.11793800	-1.57890300	4.16254900
O	-0.89211200	-0.75039500	4.64499500
H	1.95582500	-1.88811200	4.57596600
H	0.95007100	-3.30489000	4.85788300
N	-0.20367900	-1.95086700	2.87163400
C	-1.11863600	-1.27730200	1.95906500
C	-2.49406500	-1.96108000	1.94006400

O	-2.98664900	-2.40983300	0.89092900
C	-0.55226000	-1.30760900	0.54462400
O	0.88396100	-1.00604500	0.53830300
H	0.38917500	-2.65394300	2.46285200
H	-1.28365600	-0.26480000	2.29411500
H	-0.65789200	-2.29903200	0.14791100
H	-1.05031300	-0.59624900	-0.08689100
H	1.14528100	-0.14634600	0.03978600
N	-3.11039700	-2.02630700	3.10990700
C	-4.44616300	-2.62334400	3.24452800
H	-4.45252300	-3.61361700	2.81222600
H	-2.69544400	-1.55240000	3.89057700
C	0.50099200	2.62726600	3.01076300
C	2.01881400	2.45394200	2.93976400
N	2.39276800	1.24912900	2.08527500
H	0.09091000	2.80193000	2.02495200
H	0.27407000	3.48701700	3.62968800
H	2.49126900	3.30683400	2.47753800
H	2.44994900	2.28834600	3.91532200
H	3.42588700	1.14821100	2.05757200
H	2.00166200	0.38852400	2.45324300
H	2.06244100	1.35394700	1.10951300
C	5.38035300	0.56976000	-4.78578000
C	4.37811400	0.82331200	-3.67682100
C	3.01683500	0.85248300	-3.95215800
C	4.76763500	1.01222700	-2.36201200
C	2.08598600	1.00473600	-2.94754800
C	3.83820600	1.16425200	-1.34202900
C	2.47901100	1.12446000	-1.61659400
O	1.52518700	1.18340300	-0.60863400
H	5.15336000	1.16987400	-5.65947000
H	5.36568500	-0.47423100	-5.08285700
H	2.68008800	0.75358000	-4.96654000
H	5.81321100	1.03391100	-2.11939200
H	1.04786400	1.04704000	-3.19095300
H	4.18905200	1.30077100	-0.33983300

C	7.44648200	1.56319600	1.81084500
C	6.13877800	1.00807900	2.32279300
H	8.06732000	0.75508800	1.44026900
H	7.98248700	2.06948100	2.60455500
O	5.06196600	1.25522700	1.75879500
N	6.21044700	0.23019200	3.40088900
H	7.07213000	0.05764500	3.87044600
H	5.38005000	-0.25316400	3.69766500
C	2.94688100	8.39411500	-0.84274800
C	2.21693100	7.07013400	-0.71865300
C	2.89888100	5.87168400	-0.61247500
C	0.82689100	7.02748000	-0.72282800
C	2.22444200	4.66600900	-0.50042900
C	0.14609600	5.83370400	-0.61614800
C	0.84375300	4.64349000	-0.49510100
O	0.12453700	3.46902300	-0.35771400
H	4.01990200	8.24872400	-0.82653300
H	2.68547000	9.05780300	-0.02527100
H	3.97145800	5.86892600	-0.62431100
H	0.27117900	7.94045800	-0.81888500
H	2.77619700	3.75011000	-0.44885500
H	-0.92248900	5.80929100	-0.64485400
H	0.66919300	2.64976100	-0.46437900
C	-3.25262900	4.53388600	0.72540300
N	-2.80457200	3.71881300	-0.40712000
C	-3.65091400	3.04446300	-1.18369900
N	-4.95568000	3.27751300	-1.13058900
N	-3.18474400	2.12904000	-2.01395000
H	-2.37541600	4.83455500	1.27699300
H	-3.89205500	3.96116000	1.38262200
H	-5.32084300	4.00700400	-0.56168600
H	-5.61081900	2.65780500	-1.62042200
C	-6.80509800	1.08898300	3.14314600
C	-5.51163700	0.98777800	2.40197800
H	-6.65385900	1.59835600	4.08573600
H	-7.21636900	0.10652700	3.35150100

N	-5.40276900	0.38738300	1.16209000
C	-4.25987800	1.40397200	2.71661800
C	-4.10253200	0.47630400	0.77696100
N	-3.37789600	1.07778000	1.68250400
H	-3.93187600	1.89724900	3.60033300
H	-3.74756000	0.08171700	-0.14168800
H	-6.13265100	-0.05639200	0.62534500
O	-0.85484600	0.78487700	-1.89037100
H	-0.01174600	0.96620900	-1.43045800
H	-0.81334500	-0.02464100	-2.41309600
O	-6.48177900	1.34054400	-2.29098400
H	-5.81807400	0.74852800	-2.70975500
H	-6.89750800	0.83699800	-1.57128200
O	-2.91073300	-1.68607900	-1.72784100
H	-2.99676100	-2.02342300	-0.81038200
H	-2.04896300	-1.92398100	-2.09638000
O	-4.48847600	-0.20533000	-3.18463600
H	-4.35327700	-0.41582800	-4.11633200
N	2.09205600	-2.40299600	-1.12923200
C	1.86053300	-2.46672900	0.32473200
C	3.31638700	-1.99884200	0.58675100
H	3.43642000	-0.97474600	0.87434800
C	3.57678900	-2.22553700	-0.93686300
H	3.97849300	-1.37890400	-1.45241600
S	4.31859900	-3.79309100	-1.45857500
C	2.98584500	-4.00291600	-2.71969900
C	1.71689900	-3.55702000	-1.94557600
H	1.38263800	-4.35658400	-1.29396800
O	1.24281600	-3.37695000	0.88718600
C	3.26458500	-3.08538700	-3.92742700
H	4.22210700	-3.33985900	-4.36244800
H	3.27900800	-2.04119100	-3.64679500
H	2.49732700	-3.23312000	-4.67855600
C	2.87345300	-5.46872000	-3.16112100
H	2.75964100	-6.12468700	-2.30658000
H	3.75361000	-5.76790900	-3.71652400

H	2.00486300	-5.57016300	-3.79922400
N	4.00115800	-2.85581000	1.51377300
H	4.16784100	-3.79746200	1.22141000
C	4.17448200	-2.51031600	2.79752100
C	4.79892100	-3.57217200	3.67138700
H	5.73956700	-3.90605900	3.25059700
H	4.13385900	-4.42604300	3.73996100
H	4.96132500	-3.17259400	4.65994700
O	3.83765200	-1.39709400	3.22759300
C	0.55308200	-3.17230100	-2.84994200
O	0.06022900	-1.93362700	-2.54772900
O	0.07544900	-3.86368900	-3.70171600
H	-1.81735800	3.52052200	-0.46754500
H	-3.80199000	1.56390700	-2.56751000
H	-3.93513700	-0.80337800	-2.60546200
H	0.89532000	-1.94941800	5.99125200
H	-4.68180700	-2.69077200	4.29591100
H	-5.18630000	-2.01322400	2.74850300
H	6.38654700	0.81162900	-4.46591000
H	0.02688800	1.75974900	3.45733100
H	-3.76681700	5.42865700	0.39361000
H	2.69018600	8.88935100	-1.77311400
H	-7.54138500	1.64315900	2.57050700
H	-2.23021500	1.78382200	-1.95370900
H	7.24658800	2.25687600	1.01034100
N	-7.05008600	-2.97808100	-1.15271300
C	-7.40193800	-1.72771000	-1.43743400
H	-7.25323100	-3.70652300	-1.80131000
O	-7.17509400	-0.78704500	-0.65951600
C	-6.36574800	-3.32849400	0.09979400
H	-6.29385200	-4.40451800	0.15416900
H	-5.37181000	-2.90673300	0.14385200
H	-6.93894900	-2.97017500	0.94358300
C	-8.12255500	-1.49747000	-2.74633100
H	-7.85172100	-2.22877200	-3.49448300
H	-9.19241800	-1.55222700	-2.57327300

H	-7.88616000	-0.50361000	-3.09374700
H	0.72716900	-1.51372600	-1.95893100

Tetrahedral intermediate (C)

C	-0.98682500	-3.46501100	-4.80561100
C	0.15405100	-2.69264500	-4.16621400
O	1.08451400	-2.21589900	-4.82382000
H	-1.84024300	-3.52056800	-4.14589700
H	-0.64803500	-4.47102400	-5.02838000
N	0.07682900	-2.58810800	-2.83628000
C	0.94860000	-1.72377100	-2.05818500
C	2.31700800	-2.36260200	-1.75903900
O	2.75141800	-2.44583900	-0.59427500
C	0.28143100	-1.41626900	-0.71066800
O	-1.12501500	-1.00630100	-0.81591200
H	-0.69643000	-3.00444200	-2.30707400
H	1.16421400	-0.81502500	-2.60347200
H	0.33237500	-2.28416000	-0.08096400
H	0.80054000	-0.60880800	-0.23156800
H	-1.28255300	0.35771200	0.22806300
N	2.99177200	-2.78635400	-2.80979300
C	4.32536200	-3.38626400	-2.68212000
H	4.31435600	-4.15282500	-1.92101100
H	2.60322700	-2.61072800	-3.72260200
C	-0.24628300	2.15133500	-3.41215600
C	-1.57270300	1.49279300	-3.82089500
N	-2.29354800	0.85054600	-2.63588500
H	-0.36624500	2.78496900	-2.54225700
H	0.10220700	2.76118400	-4.23678700
H	-2.26024200	2.21521300	-4.23303000
H	-1.41063100	0.70670500	-4.54235500
H	-2.70525700	1.54106900	-2.00575100
H	-3.10046400	0.27504800	-2.93440600
H	-1.68547900	0.22497300	-2.08986500
C	-4.12444600	0.23554300	5.61542600

C	-3.33300600	0.58619800	4.37216200
C	-1.95695300	0.40545600	4.33306400
C	-3.96729000	1.05802100	3.23131200
C	-1.24422900	0.62799400	3.16996000
C	-3.26417700	1.27825600	2.05913200
C	-1.91113400	1.02233100	2.02867700
O	-1.19042900	1.15299700	0.81687900
H	-3.53133400	0.37972000	6.50999500
H	-4.43378600	-0.80428900	5.58091000
H	-1.43854800	0.08067900	5.21360900
H	-5.02388300	1.24246600	3.25363100
H	-0.18257000	0.51034100	3.14386600
H	-3.75343500	1.62425600	1.17260100
C	-6.57626000	3.08491400	-0.27023000
C	-5.66953600	2.18137800	-1.09421200
H	-7.25229400	2.47689800	0.32021500
H	-7.16421600	3.72127800	-0.92005000
O	-4.44302400	2.09279500	-0.90214200
N	-6.28878800	1.46106300	-2.02881700
H	-7.26864500	1.54358200	-2.19014900
H	-5.76645700	0.77570100	-2.54944800
C	-2.94932200	8.41317200	0.27837900
C	-2.21336300	7.09190500	0.16150900
C	-2.88946800	5.89746200	-0.01348500
C	-0.82590900	7.04952600	0.23389100
C	-2.21471300	4.69096800	-0.11684900
C	-0.14307000	5.85533500	0.13948400
C	-0.83736200	4.67225500	-0.03683700
O	-0.10382500	3.49491600	-0.16118800
H	-4.01609700	8.27670200	0.15138100
H	-2.60813600	9.11320400	-0.47657900
H	-3.96050900	5.90182000	-0.07507900
H	-0.27529500	7.96003400	0.37173400
H	-2.77300500	3.78796500	-0.26380500
H	0.92416700	5.82658100	0.20603300
H	-0.57019100	2.70089900	0.17372100

C	3.28998300	4.14253400	-1.61231200
N	2.84444000	3.77109400	-0.26256900
C	3.68414200	3.52651600	0.73498500
N	4.97604900	3.82084400	0.65296800
N	3.23486900	2.95709000	1.84591200
H	2.41975000	4.14460900	-2.24891700
H	3.99200100	3.42050300	-2.00171500
H	5.34955500	4.35607600	-0.09773300
H	5.59220100	3.32600600	1.29821800
C	6.92221400	0.16433600	-2.75848500
C	5.48728500	0.36173900	-2.37882600
H	7.02405400	0.14947500	-3.83552700
H	7.30485200	-0.77084900	-2.36440800
N	5.06199000	0.34281900	-1.06394700
C	4.37546600	0.59786900	-3.11988200
C	3.72232200	0.57627600	-1.06219700
N	3.26705500	0.73352600	-2.27884000
H	4.29101500	0.67716300	-4.17721800
H	3.13965100	0.64143200	-0.17721500
H	5.64564800	0.11681400	-0.27146000
O	1.49556800	1.01884600	1.45336900
H	0.56747300	1.07298400	1.18578000
H	1.81951700	0.10482200	1.62888000
O	6.09208700	1.92581900	2.28780000
H	5.40178500	1.30239400	2.61070400
H	6.64703400	1.38655400	1.69908700
O	2.44051200	-1.41536700	1.83851200
H	2.62409200	-1.82455000	0.95613300
H	1.72527000	-1.90953800	2.28457200
O	4.35729200	0.02076300	3.12322600
H	4.23174400	-0.09930700	4.07213400
N	-2.16613600	-2.29116800	0.98888400
C	-2.10151700	-2.13339600	-0.54040600
C	-3.55975900	-1.55562700	-0.51367300
H	-3.67338900	-0.49716200	-0.66280100
C	-3.64059300	-1.96640300	0.98971200

H	-3.89060900	-1.16566900	1.65456800
S	-4.52769400	-3.49327500	1.39629000
C	-3.08353500	-4.12198300	2.34375400
C	-1.88043500	-3.64406500	1.48645500
H	-1.75456700	-4.29546400	0.63154400
O	-1.87458300	-3.20555600	-1.21628500
C	-3.05923400	-3.50485400	3.75852100
H	-3.98041200	-3.74166500	4.27482500
H	-2.95096500	-2.42860400	3.71972900
H	-2.23410700	-3.92043800	4.32570800
C	-3.11563300	-5.65580500	2.42598200
H	-3.21348600	-6.09235200	1.43979200
H	-3.94345600	-5.98875200	3.04025900
H	-2.18903200	-5.99805500	2.86825300
N	-4.40927600	-2.28838400	-1.42121400
H	-4.48056600	-3.26746500	-1.22516300
C	-4.80199600	-1.83358700	-2.60429600
C	-5.56233500	-2.81400500	-3.46508700
H	-6.35763200	-3.28466200	-2.90174600
H	-4.88496800	-3.58738400	-3.81179200
H	-5.96974500	-2.29495300	-4.31781200
O	-4.55828600	-0.67195000	-2.99933700
C	-0.59819400	-3.63792500	2.29822700
O	-0.07409300	-2.38896000	2.44340200
O	-0.07271100	-4.60463900	2.77373200
H	1.86001500	3.58737700	-0.13319800
H	3.86967000	2.85036600	2.60712100
H	3.71693600	-0.54658700	2.63398500
H	-1.25117000	-2.99182100	-5.74099400
H	4.58854800	-3.82802000	-3.63136600
H	5.05708700	-2.63460000	-2.42238200
H	-5.01406100	0.84764500	5.69869300
H	0.52438100	1.42272500	-3.19338000
H	3.72435500	5.13515900	-1.62495200
H	-2.78212300	8.86092100	1.25231100
H	7.54096200	0.96481300	-2.36699700

H	2.43125400	2.32355500	1.80660200
H	-5.97579600	3.69427800	0.38649000
N	6.54310400	-2.48366000	1.83095800
C	6.90337300	-1.21242500	1.98210400
H	6.63259900	-3.11465200	2.59661900
O	6.81598800	-0.38908500	1.05565900
C	6.02229300	-3.00199100	0.55915900
H	6.02322800	-4.08097000	0.60869500
H	5.01687700	-2.65890200	0.36532300
H	6.66462800	-2.68447200	-0.24978100
C	7.48339800	-0.82852800	3.32396500
H	7.07139600	-1.42594500	4.12475000
H	8.55833900	-0.97246400	3.29697100
H	7.27818300	0.21461000	3.49863700
H	-0.72973500	-1.75694900	2.07251000

TS(C–> D)

C	0.93787000	-3.31205300	4.94097000
C	-0.18576100	-2.54051600	4.27138900
O	-1.09781300	-2.00570300	4.90715800
H	1.82048600	-3.33689500	4.31830100
H	0.60809400	-4.33060900	5.11684700
N	-0.11800300	-2.50421500	2.93518700
C	-0.98333800	-1.66148600	2.12575000
C	-2.35910600	-2.29867200	1.85054900
O	-2.79125300	-2.41528300	0.69027000
C	-0.32926600	-1.41512400	0.76139000
O	1.09117500	-1.01901600	0.82614600
H	0.63527200	-2.96532000	2.42538700
H	-1.18912800	-0.73239300	2.63958200
H	-0.39865900	-2.29954800	0.16087900
H	-0.83332500	-0.61490400	0.25781800
H	1.28576900	0.38151300	-0.23407100
N	-3.03592000	-2.68230500	2.91785800
C	-4.37195500	-3.28229400	2.81033300

H	-4.36332900	-4.07037600	2.07163100
H	-2.65254000	-2.46822100	3.82314200
C	0.22889500	2.24909700	3.38807000
C	1.50972400	1.52294900	3.82917000
N	2.23916000	0.86444200	2.65611500
H	0.39983700	2.87031400	2.51784400
H	-0.10320500	2.88176400	4.20212900
H	2.21728200	2.20625500	4.27281600
H	1.28781100	0.73478600	4.53217900
H	2.68131000	1.54595000	2.03659400
H	3.02140800	0.26295100	2.96566100
H	1.62694400	0.25723800	2.09834000
C	4.13311200	0.09815300	-5.62161200
C	3.35490200	0.48038300	-4.37885600
C	1.98788400	0.24598700	-4.30887700
C	3.98701600	1.02901800	-3.27154700
C	1.28165000	0.50035000	-3.14956000
C	3.28864100	1.28575200	-2.10252900
C	1.94502500	0.98835200	-2.04341800
O	1.23135300	1.16758800	-0.83058600
H	3.55342900	0.28615100	-6.51704500
H	4.38163600	-0.95808100	-5.59675000
H	1.47254700	-0.15084700	-5.16117200
H	5.03635000	1.24667600	-3.31640300
H	0.23171300	0.31718800	-3.09794100
H	3.77506500	1.68197800	-1.23590300
C	6.60306000	2.92177100	0.26887100
C	5.65916400	2.07941400	1.11407900
H	7.23583400	2.26833400	-0.32147500
H	7.23452700	3.53362600	0.90062800
O	4.43526200	2.00940600	0.90048100
N	6.24399100	1.38554000	2.09093900
H	7.22167500	1.45477900	2.27060500
H	5.69824800	0.72937000	2.62291200
C	3.06698900	8.39128800	-0.28143800
C	2.30740300	7.08220100	-0.17935100

C	2.96028900	5.87698800	0.00943100
C	0.92108800	7.06249300	-0.28011500
C	2.26350400	4.68198600	0.09927800
C	0.21680900	5.87985900	-0.19934200
C	0.88780100	4.68570100	-0.00833700
O	0.13369400	3.52102000	0.10250100
H	4.12886500	8.23730100	-0.13483300
H	2.72339800	9.09638600	0.46769100
H	4.02987000	5.86401000	0.09230800
H	0.38860200	7.98187200	-0.42971000
H	2.80228300	3.76875000	0.25623900
H	-0.84917600	5.86774400	-0.28843700
H	0.59496900	2.72044200	-0.22286200
C	-3.30725200	4.22496800	1.44171900
N	-2.82280900	3.81352000	0.11738500
C	-3.63230800	3.54165300	-0.89810400
N	-4.92498800	3.84292000	-0.86635500
N	-3.15045200	2.93657800	-1.97608200
H	-2.46110700	4.22098900	2.10996100
H	-4.03942500	3.52766600	1.82098200
H	-5.32010300	4.40609800	-0.14783700
H	-5.52073400	3.32326800	-1.51088300
C	-6.94342800	0.28598800	2.70486200
C	-5.50103700	0.47146400	2.34655600
H	-7.06712700	0.31570900	3.77932600
H	-7.31623900	-0.66603600	2.34282600
N	-5.05038900	0.41354400	1.04112200
C	-4.40316400	0.72854600	3.10146300
C	-3.71065800	0.64536300	1.05800500
N	-3.27836900	0.83808700	2.27836300
H	-4.33935900	0.84011700	4.15736700
H	-3.11082500	0.68413500	0.18284200
H	-5.61697700	0.16390700	0.24311000
O	-1.47339500	0.99307100	-1.41352500
H	-0.53460200	1.05621500	-1.19444700
H	-1.78820000	0.07553500	-1.60435700

O	-5.97273500	1.86929100	-2.45416700
H	-5.27772000	1.23393800	-2.74405900
H	-6.53033700	1.35303800	-1.84692100
O	-2.35833000	-1.44111200	-1.81733000
H	-2.60313900	-1.83452000	-0.94916300
H	-1.55680800	-1.90254500	-2.16836900
O	-4.24116000	-0.07785600	-3.19230700
H	-4.10988600	-0.23218000	-4.13547500
N	2.07087100	-2.36678500	-0.96117500
C	2.04762100	-2.14426700	0.61516400
C	3.50024600	-1.56772600	0.49821100
H	3.61080400	-0.50795700	0.64448000
C	3.53010800	-1.97670500	-1.00701300
H	3.71344400	-1.16324800	-1.67868600
S	4.46002200	-3.47002900	-1.44707300
C	3.00378500	-4.17806300	-2.32227200
C	1.82281800	-3.75144000	-1.42294500
H	1.72827000	-4.39129300	-0.55857200
O	1.83819400	-3.19320200	1.30900600
C	2.89898000	-3.57722900	-3.73963600
H	3.80612700	-3.78706500	-4.29125000
H	2.75089200	-2.50592400	-3.70869100
H	2.06331500	-4.02837700	-4.26023600
C	3.08791900	-5.70972000	-2.39412400
H	3.24548400	-6.13699500	-1.41155300
H	3.89314900	-6.02238600	-3.04750900
H	2.14912600	-6.07767000	-2.78971500
N	4.39751200	-2.29142100	1.36483700
H	4.53437000	-3.25364000	1.12580600
C	4.75638800	-1.86658900	2.57247500
C	5.56190000	-2.84230800	3.39601600
H	6.39472400	-3.23198800	2.82471000
H	4.92865400	-3.67356000	3.68761500
H	5.92213100	-2.34556300	4.28256100
O	4.45204900	-0.73717600	3.00982600
C	0.50130900	-3.65800400	-2.20853400

O	0.09283500	-2.39386100	-2.21331300
O	-0.03037600	-4.60173200	-2.73917400
H	-1.83596900	3.62305100	0.02196100
H	-3.76315500	2.80881400	-2.75222800
H	-3.60035400	-0.62693800	-2.67947000
H	1.15293500	-2.86115200	5.89891800
H	-4.63452900	-3.69610000	3.77236600
H	-5.10281600	-2.53710700	2.52999300
H	5.05662100	0.65889400	-5.69371700
H	-0.57576600	1.56152000	3.15711900
H	-3.71993200	5.22663100	1.41733100
H	2.92520700	8.84230300	-1.25787700
H	-7.55551800	1.06771500	2.26777700
H	-2.36321600	2.28749800	-1.88070000
H	6.02930200	3.55379000	-0.39045200
N	-6.49470900	-2.51164900	-1.77324200
C	-6.81638300	-1.24197100	-2.00294100
H	-6.56651800	-3.17781700	-2.51049000
O	-6.74079400	-0.37320700	-1.11745000
C	-6.03371800	-2.97665500	-0.45849400
H	-6.06161900	-4.05646500	-0.45432400
H	-5.02719600	-2.64915200	-0.24514900
H	-6.69704900	-2.60299500	0.30862700
C	-7.34055300	-0.91935600	-3.38363300
H	-6.88221400	-1.54288500	-4.13804500
H	-8.41322100	-1.08064700	-3.39990100
H	-7.14043800	0.11794600	-3.59279400
H	1.07858700	-1.92719100	-1.63399000

Inhibited enzyme (D)

C	2.11696000	-4.82768500	-4.48508500
C	2.40277100	-3.44168900	-3.94689300
O	2.82994100	-2.52442600	-4.64245000
H	1.17352500	-5.20124900	-4.10877600
H	2.90269000	-5.50538900	-4.16798800

N	2.17091400	-3.28821400	-2.62508400
C	2.18489600	-1.98129800	-1.96903500
C	3.61148400	-1.51452500	-1.60497300
O	3.89239500	-1.21293800	-0.43494800
C	1.39529000	-2.05390200	-0.66846300
O	-0.02684300	-2.39363900	-0.87061200
H	1.79095200	-4.05022000	-2.09848500
H	1.76405300	-1.24065000	-2.63781100
H	1.83539900	-2.77660800	-0.00394100
H	1.34939300	-1.10123900	-0.19426600
H	-1.42204600	-1.44227800	1.16961700
N	4.45737900	-1.44294000	-2.61833900
C	5.84595100	-0.99276700	-2.45501500
H	6.41282300	-1.70359900	-1.86848400
H	4.11044300	-1.65011400	-3.53932000
C	-1.01368900	1.25221300	-2.52494500
C	-1.75064500	-0.04212500	-2.87859800
N	-2.78874100	-0.40685100	-1.81189400
H	-1.69673300	2.08611000	-2.44464200
H	-0.26715800	1.46941800	-3.27952600
H	-2.27827100	0.02824800	-3.81721100
H	-1.06728200	-0.87595300	-2.90370300
H	-3.61162800	0.20221400	-1.78738800
H	-3.15823500	-1.34684600	-1.98402400
H	-2.35899900	-0.40384500	-0.87267300
C	-4.04785100	2.64810400	4.98139500
C	-3.46806300	1.78123900	3.88012500
C	-2.26212100	1.11455300	4.07078400
C	-4.11511800	1.62628900	2.66608400
C	-1.70920000	0.33087400	3.07878500
C	-3.58330000	0.82569300	1.66349300
C	-2.37822700	0.18921600	1.87495200
O	-1.80647100	-0.56894200	0.84020800
H	-3.35647700	3.43881600	5.25164800
H	-4.24725000	2.05741200	5.86899800
H	-1.74515400	1.21779000	5.00535500

H	-5.04740600	2.12697400	2.49305200
H	-0.76984200	-0.16830200	3.20926400
H	-4.12151400	0.68524100	0.74821900
C	-7.85434400	0.35123600	-0.73399800
C	-6.51776000	-0.20758400	-1.20171200
H	-8.20781000	-0.21017800	0.12272500
H	-8.58757500	0.27229700	-1.52763200
O	-5.47220400	0.45982000	-1.21364300
N	-6.55806400	-1.48580900	-1.59347700
H	-7.41346300	-1.99713600	-1.58763200
H	-5.72740000	-1.96747800	-1.88979600
C	-6.37255800	7.15345300	-1.09706600
C	-5.26065300	6.14498100	-0.87898100
C	-5.49150800	4.78243900	-0.97037000
C	-3.97235300	6.57351100	-0.58285300
C	-4.47318300	3.86252800	-0.77576700
C	-2.95246700	5.66688500	-0.37796200
C	-3.20478300	4.31304200	-0.47514200
O	-2.12889900	3.42747800	-0.30188800
H	-7.31016400	6.65810700	-1.31569100
H	-6.13749200	7.80990600	-1.92788500
H	-6.47639700	4.42886500	-1.20573600
H	-3.76789400	7.62387400	-0.50689400
H	-4.68174600	2.81519700	-0.87088200
H	-1.96027500	5.99348300	-0.14497200
H	-2.29444100	2.77018800	0.39175300
C	0.95049600	5.19406000	-2.03001700
N	0.60960500	4.52093100	-0.77021900
C	1.48255000	4.37736500	0.22645300
N	2.56424500	5.13133400	0.30227700
N	1.24378000	3.45494600	1.15012300
H	0.12660000	5.04721800	-2.71150300
H	1.83639000	4.75697800	-2.46430000
H	2.69439100	5.89699100	-0.32024000
H	3.31321800	4.88996300	0.97026600
C	6.13888600	3.39691600	-2.45605900

C	4.75856500	2.82710800	-2.39892700
H	6.31594700	3.84371300	-3.42547700
H	6.88916200	2.63000400	-2.29338400
N	4.25302000	2.19830200	-1.27743700
C	3.75838500	2.80539500	-3.31465500
C	2.96554000	1.83916900	-1.55722200
N	2.63130800	2.18541600	-2.77086600
H	3.76814700	3.18346600	-4.30908500
H	2.32337200	1.37411300	-0.85229500
H	4.75886400	2.02283700	-0.42399100
O	0.53125000	0.91153900	0.49718400
H	-0.22693100	0.32303100	0.64033400
H	1.30279300	0.63136100	1.03965400
O	4.38783300	4.18047800	2.00887800
H	3.90365500	3.63391400	2.65901000
H	4.97879600	3.56773800	1.53404800
O	2.67009300	0.06326300	1.86516500
H	3.25413700	-0.33382100	1.19333100
H	2.05211300	-0.63811700	2.26960500
O	2.95281900	2.25827500	3.23387700
H	2.50815600	2.13521400	4.08167400
N	-1.39295300	-3.02607000	1.86425700
C	-0.49330200	-3.65349300	-0.84825500
C	-1.94956300	-3.67867700	-0.43468900
H	-2.34614400	-2.70013700	-0.59235400
C	-2.17542800	-3.99003200	1.06774200
H	-3.22944300	-3.84117600	1.24613700
S	-1.69258700	-5.68189100	1.60335200
C	-0.39401800	-5.05353100	2.78328400
C	-0.09627200	-3.66468900	2.20805600
H	0.43062800	-3.82428900	1.28327800
O	0.16350400	-4.62725800	-1.12758100
C	-0.94789300	-4.99208900	4.21437600
H	-1.18577500	-5.98782400	4.56664700
H	-1.85500200	-4.40084100	4.27028700
H	-0.19458800	-4.55002700	4.84982400

C	0.85628100	-5.94261400	2.72523900
H	1.22399100	-6.02490500	1.70925700
H	0.64134200	-6.93763000	3.09518500
H	1.61170800	-5.48580000	3.34998800
N	-2.68296200	-4.60609300	-1.27857400
H	-2.39383100	-5.56424200	-1.26108200
C	-3.67157300	-4.19329100	-2.08613300
C	-4.36653700	-5.27716500	-2.87116800
H	-4.86912100	-5.95942200	-2.19503200
H	-3.64682500	-5.84179400	-3.45175200
H	-5.08859100	-4.82818900	-3.53401800
O	-3.99452200	-2.99749100	-2.16877500
C	0.80590700	-2.70304700	3.00593700
O	0.83592400	-1.53519900	2.46737600
O	1.44211500	-3.11155000	3.96660800
H	-0.27703700	4.05042500	-0.69171000
H	1.86235000	3.32544800	1.93030500
H	2.93572600	1.40379700	2.70777400
H	2.10365300	-4.78793200	-5.56290400
H	6.28655000	-0.91289600	-3.43703100
H	5.87052200	-0.02882500	-1.97165800
H	-4.97629200	3.10748100	4.66705000
H	-0.48942600	1.15135900	-1.58497400
H	1.08334000	6.26088500	-1.89078100
H	-6.51368800	7.76646800	-0.21341700
H	6.27561000	4.15980200	-1.69687300
H	0.68171900	2.64648800	0.90995200
H	-7.73053900	1.38658400	-0.45973800
N	6.90982700	0.26887600	2.14573700
C	6.31660900	1.45679400	2.18385300
H	7.32017700	-0.10267400	2.97367100
O	5.78898600	1.96347500	1.17811700
C	6.96836800	-0.53097700	0.91624500
H	7.45329100	-1.46792300	1.14744200
H	5.97659900	-0.72311300	0.53775900
H	7.54467400	-0.01208800	0.16164100

C	6.27597800	2.15037700	3.52554500
H	5.27038300	2.04542700	3.91322900
H	6.98736500	1.74191800	4.22698000
H	6.45447800	3.20650500	3.38674700
H	-1.88575900	-2.77166200	2.70778300

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