

# Tellurium

Te

## ***General Information***

### **Discovery**

Tellurium was discovered by Baron Muller von Reichenstein in 1783 in Sibiu, Romania. Klaproth isolated the element and named it in 1798.

### **Appearance**

Crystalline tellurium is a silvery-white colour with a metallic lustre, but is most often seen as the grey, powdery amorphous form.

### **Source**

Tellurium is present in the Earth's crust only in 0.001 parts per million. It is obtained commercially from the anode muds produced during the electrolytic refining of copper.

### **Uses**

Tellurium is used in alloys, mostly with copper and stainless steel, to improve their machinability. When added to lead it decreases the corrosive action of sulphuric acid on lead and improves its strength and hardness. Tellurium is also used in ceramics. It can be doped with silver, gold, copper or tin in semiconductor applications.

### **Biological Role**

Tellurium has no known biological role. It is very toxic and teratogenic. Workmen exposed to very small quantities of tellurium in the air develop "tellurium breath", which has a garlic-like odour.

### **General Information**

Tellurium burns in air or oxygen with a greenish-blue flame, forming tellurium(IV) oxide. It is unaffected by water or hydrochloric acid, but reacts with nitric acid. Tellurium is a p-type semiconductor, and its conductivity increases slightly with exposure to light. Molten tellurium corrodes iron, copper and stainless steel.

## Physical Information

Atomic Number	52
Relative Atomic Mass ( $^{12}\text{C}=12.000$ )	127.6
Melting Point/K	722.7
Boiling Point/K	1263
Density/kg m <sup>-3</sup>	6240 (293K)
Ground State Electron Configuration	[Kr]4d <sup>10</sup> 5s <sup>2</sup> 5p <sup>4</sup>
Electron Affinity (M-M <sup>-</sup> )/kJ mol <sup>-1</sup>	-190.2

## Key Isotopes

Nuclide	<sup>120</sup> Te	<sup>122</sup> Te	<sup>123</sup> Te	<sup>124</sup> Te	<sup>125</sup> Te	<sup>126</sup> Te
Atomic mass	119.9	121.9	122.9	123.9	124.9	125.9
Natural abundance	0.096%	2.6%	0.908%	4.816%	7.18%	18.95%
Half-life	stable	stable	1.2x10 <sup>13</sup> yrs	stable	stable	stable
Nuclide	<sup>127</sup> Te	<sup>128</sup> Te	<sup>130</sup> Te			
Atomic mass		127.9	129.9			
Natural abundance	0%	31.69%	33.8%			
Half-life	9.4 h	stable	stable			

## Ionisation Energies/kJ mol<sup>-1</sup>

M - M <sup>+</sup>	869.2
M <sup>+</sup> - M <sup>2+</sup>	1795
M <sup>2+</sup> - M <sup>3+</sup>	2698
M <sup>3+</sup> - M <sup>4+</sup>	3610
M <sup>4+</sup> - M <sup>5+</sup>	5668
M <sup>5+</sup> - M <sup>6+</sup>	6822
M <sup>6+</sup> - M <sup>7+</sup>	13200
M <sup>7+</sup> - M <sup>8+</sup>	15800
M <sup>8+</sup> - M <sup>9+</sup>	18500
M <sup>9+</sup> - M <sup>10+</sup>	21200

## Other Information

Enthalpy of Fusion/kJ mol <sup>-1</sup>	13.5
Enthalpy of Vaporisation/kJ mol <sup>-1</sup>	104.6
<b>Oxidation States:</b>	
Main	Te <sup>+4</sup>
Others	Te <sup>-2</sup> , Te <sup>-1</sup> , Te <sup>0</sup> , Te <sup>+2</sup> , Te <sup>+5</sup> , Te <sup>+6</sup>
<b>Covalent Bonds/kJ mol<sup>-1</sup></b>	
Te - H	240
Te - O	268
Te - F	335
Te - Cl	251
Te - Te	235