

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. Finally, 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 dissolves in 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 ⁻³	6240 (293K)
Ground State Electron Configuration	[Kr]4d ¹⁰ 5s ² 5p ⁴
Electron Affinity (M-M ⁻)/kJ mol ⁻¹	190.2

Key Isotopes

Nuclide	¹²⁰ Te	¹²² Te	¹²³ Te	¹²⁴ Te	¹²⁵ Te	¹²⁶ 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 ¹³ yrs	stable	stable	stable
Nuclide	¹²⁷ Te	¹²⁸ Te	¹³⁰ 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⁻¹

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

Other Information

Enthalpy of Fusion/kJ mol ⁻¹	13.5
Enthalpy of Vaporisation/kJ mol ⁻¹	104.6
Oxidation States:	
Main	Te ^{IV}
Others	Te ^{-II} , Te ^{-I} , Te ^O , Te ^{II} , Te ^V , Te ^{VI}
Covalent Bonds/kJ mol⁻¹	
Te - H	240
Te - O	268
Te - F	335
Te - Cl	251
Te - Te	235