

Platinum

Pt

General Information

Discovery

Platinum was discovered by South Americans and taken to Europe about 1750. The metal was used by pre-Columbian Indians.

Appearance

Platinum is a beautiful silvery-white metal, and is malleable and ductile.

Source

Platinum is found uncombined in alluvial deposits, and prepared commercially as a by-product of nickel refining from copper-nickel ores.

Uses

Platinum is used extensively for jewellery, wire and many valuable instruments including thermocouple elements. It is also used for electrical contacts, corrosion-resistance apparatus and in dentistry. In a finely divided state platinum absorbs large volumes of hydrogen and so is used as a catalyst in the petroleum cracking industry.

Biological Role

Platinum has no known biological role, and is non-toxic.

General Information

Platinum is not affected by air or water at any temperature. It is insoluble in hydrochloric and nitric acids, but dissolves when they are mixed to form *aqua regia*.

The price of platinum fluctuates, but it can cost eight times as much as gold.

Physical Information

Atomic Number	78
Relative Atomic Mass ($^{12}\text{C}=12.000$)	195.08
Melting Point/K	2045
Boiling Point/K	4100
Density/kg m ⁻³	21450 (293K)
Ground State Electron Configuration	[Xe]4f ¹⁴ 5d ⁹ 6s ¹
Electron Affinity (M-M ⁻)/kJ mol ⁻¹	-247

Key Isotopes

Nuclide	¹⁹⁰ Pt	¹⁹² Pt	¹⁹⁴ Pt	¹⁹⁵ Pt	¹⁹⁶ Pt	¹⁹⁷ Pt
Atomic mass	189.96	191.96	193.96	194.96	195.96	
Natural abundance	0.01%	0.79%	32.9%	33.8%	25.3%	0%
Half-life	6.9x10 ¹¹ yrs	10 ¹⁵ yrs	stable	stable	stable	18 h
Nuclide	¹⁹⁸ Pt					
Atomic mass	197.97					
Natural abundance	7.2%					
Half-life	stable					

Ionisation Energies/kJ mol⁻¹

M - M ⁺	870
M ⁺ - M ²⁺	1791
M ²⁺ - M ³⁺	2800
M ³⁺ - M ⁴⁺	3900
M ⁴⁺ - M ⁵⁺	5300
M ⁵⁺ - M ⁶⁺	7200
M ⁶⁺ - M ⁷⁺	8900
M ⁷⁺ - M ⁸⁺	10500
M ⁸⁺ - M ⁹⁺	12300
M ⁹⁺ - M ¹⁰⁺	14100

Other Information

Enthalpy of Fusion/kJ mol ⁻¹	19.7
Enthalpy of Vaporisation/kJ mol ⁻¹	469
Oxidation States	
Main	Pt ⁺⁴
Others	Pt ⁰ , Pt ⁺² , Pt ⁺⁵ , Pt ⁺⁶