

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 as 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 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 ^{IV}
Others	Pt ⁰ , Pt ^{II} , Pt ^V , Pt ^{VI}
Covalent Bonds/kJ mol ⁻¹	
Not applicable	