

Polonium

Po

General Information

Discovery

Polonium was discovered in 1898 in Paris, France. It was the first element discovered by Marie Curie, while she was investigating the cause of radioactivity in pitchblende.

Appearance

Polonium is a silvery-grey, radioactive metal.

Source

Polonium is a very rare natural element. It is obtained when natural bismuth, ^{209}Bi , is bombarded by neutrons to give ^{210}Bi , the parent of polonium.

Uses

Polonium is an alpha-emitter, and is used as an alpha-particle source for scientific research in the form of a thin film on a stainless steel disc. It is also used as a heat source in space equipment. It can be mixed or alloyed with beryllium to provide a source of neutrons.

Biological Role

Polonium has no known biological role. It is highly toxic due to its radioactivity.

General Information

Polonium readily reacts with dilute acids, but only slightly with alkalis. A milligram of polonium emits as many alpha particles per second as 5 grams of radium. The energy released by its decay is so large that a capsule containing about 0.5 grams reaches a temperature above 500K.

Physical Information

Atomic Number	84
Relative Atomic Mass ($^{12}\text{C}=12.000$)	209 (radioactive)
Melting Point/K	527
Boiling Point/K	1235
Density/kg m ⁻³	9320 (293K)
Ground State Electron Configuration	[Xe]4f ¹⁴ 5d ¹⁰ 6s ² 6p ⁴
Electron Affinity (M-M ⁻)/kJ mol ⁻¹	-186

Key Isotopes

Nuclide	²⁰⁹ Po	²¹⁰ Po	²¹¹ Po	²¹⁶ Po	²¹⁸ Po
Atomic mass	208.98	209.98	210.99	216.0	218.0
Natural abundance	0%	trace	trace	trace	trace
Half-life	103 yrs	138.4 days	0.52 secs	0.15 secs	3.05 mins

Ionisation Energies/kJ mol⁻¹

M - M ⁺	812
M ⁺ - M ²⁺	1800
M ²⁺ - M ³⁺	2700
M ³⁺ - M ⁴⁺	3700
M ⁴⁺ - M ⁵⁺	5900
M ⁵⁺ - M ⁶⁺	7000
M ⁶⁺ - M ⁷⁺	10800
M ⁷⁺ - M ⁸⁺	12700
M ⁸⁺ - M ⁹⁺	14900
M ⁹⁺ - M ¹⁰⁺	17000

Other Information

Enthalpy of Fusion/kJ mol ⁻¹	10
Enthalpy of Vaporisation/kJ mol ⁻¹	100.8

Oxidation States

Main	Po ⁺⁴
Others	Po ⁻² , Po ⁺² , Po ⁺⁶