

Isotopes of Polonium

Isotope	Atomic Mass	Half-life	Mode of Decay	Nuclear Spin	Nuclear Magnetic Moment
Po-206	205.98047	8.80 days	EC to Bi-206; α to Pb-202	0	No data available
Po-207	206.98158	5.80 hours	EC to Bi-207; α to Pb-203	5/2	0.79
Po-208	207.98123	2.898 years	EC to Bi-208; α to Pb-204	0	No data available
Po-209	208.982404	102.00 years	EC to Bi-209; α to Pb-205	1/2	1.77
Po-210	209.98286	138.38 days	α to Pb-206	0	No data available

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Po

Polonium was discovered in 1898 by Marie Sklodowska Curie. It is named for Poland, her birthplace.

Two crystalline forms of polonium exist: the *alpha* allotrope, with a simple cubic low-temperature form and a density of 9.196 g/cm³; and the *beta* modification, with a rhombohedral high-temperature form and a density of 9.398 g/cm³. Both allotropic forms coexist from 18-54 °C and vaporize at 962 °C.

Polonium is practically insoluble in water and soluble in dilute mineral acids. At ordinary temperatures, it oxidizes slowly in air, forming its basic oxide. The metal dissolves in dilute hydrochloric acid, forming pink-red polonium. It dissolves in concentrated nitric acid and *aqua regia*, oxidizing to the Po⁴⁺ state.

Because of its radioactivity and alpha emission, polonium forms many types of radiolytic oxidation-reduction products. It is used on brushes to remove dusts from photographic film, as well as in instruments to eliminate static charges. It is also used as a small source to generate alpha particles and neutrons, and as a power source in devices where its radioactive decay energy is converted to electrical energy.

As with other radioactive substances, exposure to polonium's ionizing radiation can cause cancer. When ingested, it tends to accumulate in the liver, kidneys and spleen, causing radiation damage from the alpha particles. All operations and handling must be carried out by mechanical means, in leak-proof boxes, behind thick neutron shields.

Properties of Polonium

Name	Polonium
Symbol	Po
Atomic number	84
Atomic weight	209.0

Properties of Polonium (continued)

Standard state	Solid at 298 °K
CAS Registry ID	7440-08-6
Group in periodic table	16
Group name	Chalcogen
Period in periodic table	6
Block in periodic table	p-block
Color	Silvery
Classification	Metallic
Melting point	254 °C
Boiling point	962 °C
Thermal conductivity	20 (estimated) W/(m·K)
Electrical resistivity	$40 \times 10^{-8} \Omega \cdot m$
Electronegativity	2.0
Heat of vaporization	About 100 kJ·mol ⁻¹
Heat of fusion	About 13 kJ·mol ⁻¹
Density of solid	9.20 g/cm ³ (alpha form)
Electron configuration	[Xe]4f ¹⁴ 5d ¹⁰ 6s ² 6p ⁴
Atomic radius	1.64 Å
Atomic volume	23.53 cm ³ /g-atom
Oxidation states	-2, 0, +2, +4, +6