

Isotopes of Radium

Isotope	Atomic Mass	Half-life	Mode of Decay	Nuclear Spin	Nuclear Magnetic Moment
Ra-223	223.018497	11.435 days	α to Rn-219; C-14	3/2	0.271
Ra-224	224.020202	3.66 days	α to Rn-220; C-12	0	No data available
Ra-225	225.023603	14.90 days	β^- to Ac-225	3/2	-0.734
Ra-226	226.025403	1599 years	α to Rn-222; C-14	0	No data available
Ra-227	227.029170	42.00 minutes	β^- to Ac-227	3/2	-0.404
Ra-228	228.031063	5.76 years	β^- to Ac-228	0	No data available

88

Ra

Radium was discovered in 1898 by Pierre and Marie Curie. It takes its name from the Latin word *radius*, meaning “ray.”

The chemistry of radium is very similar to that of barium. The metal forms a number of salts in its +2 valence state, the only valence state typical of alkaline earth metals. The few salts that are of commercial use include chloride (RaCl_2), bromide (RaBr_2) and sulfate (RaSO_4).

Radium was once an additive in products such as toothpaste, hair creams and even food items, due to its supposed curative powers. Such products soon were prohibited by authorities in many countries after it was discovered they could have serious adverse health effects. Mixed with phosphors in minute proportion, radium has also been used to make luminous paints and watch dials — these uses were discontinued in the 1960s.

Radium salts have several applications. Used historically in cancer treatment for destroying malignant tumors, they have been replaced by more readily available and low-cost radioisotopes such as Cobalt-60. Radium's gamma radiation is used for irradiating metals to detect fractures in welding. Radium-226 is a source material for producing Radon-222 in radiotherapy treatments (Radon-222 is safer to use because of its much shorter half-life of 3.8 days). The radiation from radium can cause lung cancer, osteogenic sarcoma, blood dyscrasias and injury to skin. Inhalation, ingestion, skin contact or bodily exposure to radium or any of its salts must be avoided.

Properties of Radium

Name	Radium
Symbol	Ra
Atomic number	88
Atomic weight	226
Standard state	Solid at 298 °K
CAS Registry ID	7440-14-4
Group in periodic table	2
Group name	Alkaline earth metal
Period in periodic table	7
Block in periodic table	s-block
Color	Metallic
Classification	Metallic
Melting point	700 °C
Boiling point	1737 °C
Thermal conductivity	19.00 W/(m·K)
Electrical resistivity	100 x 10 ⁻⁸ Ω·m
Electronegativity	0.9
Heat of vaporization	About 125 kJ·mol ⁻¹
Heat of fusion	About 8 kJ·mol ⁻¹
Density of solid	5.00 g/cm ³
Electron configuration	[Rn]7s ²
Oxidation state	+2