

Actinium

Ac

General Information

Discovery

Actinium was discovered by A. Debierne in 1899 in Paris, France.

Appearance

Actinium is a soft, silvery-white metal which glows in the dark.

Source

Actinium occurs naturally in uranium minerals. It is made by the neutron bombardment of the radium isotope ^{226}Ra .

Uses

Actinium is a very powerful source of alpha rays, but is rarely used outside research.

Biological Role

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

General Information

Actinium reacts with water to evolve hydrogen gas. Its chemical properties have been little studied.

Physical Information

Atomic Number	89
Relative Atomic Mass ($^{12}\text{C}=12.000$)	227 (radioactive)
Melting Point/K	1320
Boiling Point/K	3470
Density/kg m ⁻³	10060 (293K)
Ground State Electron Configuration	[Rn]6d ¹ 7s ²

Key Isotopes

Nuclide	²²⁵ Ac	²²⁷ Ac	²²⁸ Ac
Atomic mass		227.03	
Natural abundance	0%	trace	trace
Half-life	10 days	21.6 yrs	6.13 h

Ionisation Energies/kJ mol⁻¹

M - M ⁺	499
M ⁺ - M ²⁺	1170
M ²⁺ - M ³⁺	1900
M ³⁺ - M ⁴⁺	4700
M ⁴⁺ - M ⁵⁺	6000
M ⁵⁺ - M ⁶⁺	7300
M ⁶⁺ - M ⁷⁺	9200
M ⁷⁺ - M ⁸⁺	10500
M ⁸⁺ - M ⁹⁺	11900
M ⁹⁺ - M ¹⁰⁺	15800

Other Information

Enthalpy of Fusion/kJ mol⁻¹ 14.2

Enthalpy of Vaporisation/kJ mol⁻¹ 293

Oxidation States

Ac⁰, Ac^{III}

Covalent Bonds/kJ mol⁻¹

Not applicable