

Europium

Eu

General Information

Discovery

Europium was discovered by E.A. Demarcay in 1901 in Paris, France. The pure metal has only recently been prepared.

Appearance

Europium is a soft, silvery-white metal.

Source

In common with other rare earth elements, europium is found principally in the minerals monazite and basnaesite, from which it can be prepared. However, the usual method of preparation is by heating europium (III) oxide with an excess of lanthanum under vacuum.

Uses

Europium can absorb more neutrons per atom than any other element, making it valuable in control rods for nuclear reactors. Europium-doped plastic has been used as a laser material. Otherwise this element is very little used.

Biological Role

Europium has no known biological role, and has low toxicity.

General Information

Europium is the costliest and one of the rarest of the rare earth elements. It is as hard as lead and ductile, and is the most reactive of the rare earth metals, reacting rapidly with water and air.

Physical Information

Atomic Number	63
Relative Atomic Mass ($^{12}\text{C}=12.000$)	151.97
Melting Point/K	1095
Boiling Point/K	1870
Density/kg m ⁻³	5243 (293K)
Ground State Electron Configuration	[Xe]4f ⁷ 6s ²
Electron Affinity (M-M ⁻)/kJ mol ⁻¹	50

Key Isotopes

Nuclide	¹⁵¹ Eu	¹⁵² Eu	¹⁵³ Eu
Atomic mass	150.9		152.9
Natural abundance	47.8%	0%	52.2%
Half-life	stable	12.7 yrs	stable

Ionisation Energies/kJ mol⁻¹

M - M ⁺	546.7
M ⁺ - M ²⁺	1085
M ²⁺ - M ³⁺	2404
M ³⁺ - M ⁴⁺	4110
M ⁴⁺ - M ⁵⁺	
M ⁵⁺ - M ⁶⁺	
M ⁶⁺ - M ⁷⁺	
M ⁷⁺ - M ⁸⁺	
M ⁸⁺ - M ⁹⁺	
M ⁹⁺ - M ¹⁰⁺	

Other Information

Enthalpy of Fusion/kJ mol⁻¹ 10.5

Enthalpy of Vaporisation/kJ mol⁻¹ 176

Oxidation States

Main Eu^{III}

Others Eu^{II}

Covalent Bonds/kJ mol⁻¹

Not applicable