



### Key Properties

Atomic Mass	151.964
Category	Lanthanides
State at 20°C	solid
Melting Point	822°C
Boiling Point	1529°C
Density	5.264
Electron Config	[Xe] 4f76s2
Electronegativity	null
Year Discovered	1901
Discovered By	Eugène-Anatole Demarçay

### Did You Know?

- 1 It is the most reactive of all the rare earth elements; it tarnishes quickly in air and reacts with water similarly to calcium.
- 2 Europium is responsible for the red phosphor in old cathode-ray tube (CRT) televisions, which was essential for creating a full-color picture.
- 3 The anti-counterfeiting security feature on Euro banknotes uses a europium-based phosphor that glows red under UV light.
- 4 It is named after the continent of Europe.
- 5 Due to its ability to absorb neutrons, it is also studied for use in control rods for nuclear reactors.

#### APPEARANCE

Europium is a soft, silvery, highly reactive metal.

#### SUPERHERO PERSONA

"The Red-Light, the hero who brought bright, true red to color television screens."

#### EVERYDAY CONNECTION

Europium is found in the red phosphor in an old cathode-ray tube television screen.

#### POP CULTURE

Europium is used as an anti-counterfeiting measure in Euro banknotes  
it glows under UV light.

## Overview of Europium

Europium is a soft, silvery lanthanide metal that tarnishes quickly in air and reacts with water. Despite being relatively reactive, europium's compounds are incredibly valuable for their fluorescent properties—they glow under ultraviolet (UV) light. This unique feature has made europium an essential element in lighting, electronics, and security applications. The element is named after the continent of Europe, reflecting its discovery by a French chemist.

## Uses of Europium

Europium's optical and nuclear properties make it a vital component in several technologies:

**Security features:** Europium is used in the phosphorescent ink printed on euro banknotes, which glows red under UV light. This anti-counterfeiting measure is very difficult to replicate.

**Lighting and displays:** Europium-doped phosphors are used in low-energy fluorescent bulbs, LED lights, and TV/computer screens to produce red and blue colors, balancing the harshness of white light and enhancing display quality.

**Nuclear technology:** Europium has a high ability to absorb neutrons, making it an important component of control rods in nuclear reactors.

**Lasers and materials science:** Europium-doped plastics and glasses are used in laser materials and in the development of specialized superconducting alloys.

## Natural Occurrence and Production of Europium

Europium is found in rare earth minerals such as monazite and bastnaesite, often alongside other lanthanides.

Commercial production typically involves:

Extracting europium from mixed rare-earth ores using ion exchange or solvent extraction.

Reducing europium(III) oxide (Eu<sub>2</sub>O<sub>3</sub>) with lanthanum or other metals in a vacuum to produce the pure element.

## History of Europium

Late 1800s – Confusion with didymium: Chemists initially believed they had isolated an element called didymium, which was later revealed to be a mixture of several lanthanides, including europium.

1901 – Discovery: French chemist Eugène-Anatole Demarçay successfully isolated europium after years of separating rare earth impurities, making it one of the last lanthanides to be distinguished.

## Biological Role of Europium

Europium has no known biological role and is considered to have low toxicity. Like other rare earth elements, it should still be handled with care in laboratory and industrial settings.

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