

58
Ce
Cerium
140.116

Key Properties

| | |
|-------------------|---|
| Atomic Mass | 140.116 |
| Category | Lanthanides |
| State at 20°C | solid |
| Melting Point | 799°C |
| Boiling Point | 3443°C |
| Density | 6.77 |
| Electron Config | [Xe] 4f15d16s2 |
| Electronegativity | 1.12 |
| Year Discovered | 1803 |
| Discovered By | Jöns Jacob Berzelius & Wilhelm Hisinger |

Did You Know?

- 1 It is the most abundant of all the rare earth elements, making up about 0.0066% of the Earth's crust, which is about as abundant as copper.
- 2 It is a primary component of mischmetal, an alloy that produces a hot spark when struck, making it ideal for the flint in cigarette lighters.
- 3 Cerium(IV) oxide is a highly effective polishing agent for glass and is used to polish telescope mirrors, camera lenses, and even the glass on your smartphone.
- 4 It is named after the dwarf planet Ceres, which was discovered just two years before the element.
- 5 The walls of some self-cleaning ovens are coated with a cerium compound that helps oxidize cooking residues.

APPEARANCE

Cerium is a silvery-white, ductile, and soft metal.

SUPERHERO PERSONA

"The Spark, the most common of the rare earths, a hero who creates the spark in every lighter."

EVERYDAY CONNECTION

Cerium is found in the flint in a cigarette lighter.

POP CULTURE

Cerium is a component of self-cleaning ovens.

Overview of Cerium

Cerium is a soft, silvery-gray metal that belongs to the lanthanide series, often referred to as the rare earth elements. Despite the name, cerium is relatively common—more abundant in Earth's crust than tin or lead. It tarnishes quickly in air, reacts with water, and is usually stored under oil to prevent oxidation.

Uses of Cerium

Cerium's unique chemical and physical properties make it useful across several industries:

Sparking properties: Cerium is the primary component of mischmetal, an alloy that produces bright sparks when struck. This makes it the essential material in lighter "flints," alongside iron.

Catalysts: Cerium(IV) oxide (CeO₂) is widely used as a catalyst. It coats the interior walls of self-cleaning ovens to prevent residue buildup and is a vital part of catalytic converters in cars, reducing harmful emissions.

Pigments: Cerium sulfide (Ce₂S₃) is a stable, non-toxic red pigment used in paints and plastics.

Lighting and electronics: Cerium compounds are used in low-energy light bulbs, flat-screen TVs, and floodlights, as well as in polishing glass and semiconductors.

Natural Occurrence and Production of Cerium

Cerium is the most abundant of the lanthanides and does not occur in pure form naturally. It is mainly found in the minerals bastnaesite and monazite, both of which are mined extensively for rare earth production.

Pure cerium metal is extracted by electrolyzing molten cerium chloride or through metallothermic reduction using calcium.

History of Cerium

1803 – Discovery: Cerium was independently identified by Jöns Jakob Berzelius and Wilhelm Hisinger in Sweden, and Martin Heinrich Klaproth in Germany. They discovered the element in a Swedish mineral.

1875 – Isolation: Chemists William Hillebrand and Thomas Norton successfully isolated metallic cerium by passing an electric current through molten cerium chloride.

Biological Role of Cerium

Cerium has no known biological role in humans or animals and is not considered highly toxic in its pure form. Some cerium compounds can, however, irritate the skin and respiratory system in high concentrations.