



Key Properties

Atomic Mass	91.224
Category	Transition Metals
State at 20°C	solid
Melting Point	1854°C
Boiling Point	4406°C
Density	6.52
Electron Config	[Kr] 4d25s2
Electronegativity	1.33
Year Discovered	1789
Discovered By	Martin Heinrich Klaproth

Did You Know?

- 1 Its exceptional resistance to corrosion and heat, and its inability to absorb neutrons, makes it the primary material used to encase fuel rods in nuclear power plants.
- 2 The gemstone zircon is a zirconium silicate mineral; however, it should not be confused with cubic zirconia, which is a synthetic, crystalline form of zirconium dioxide.
- 3 Ceramics made from zirconium dioxide are so tough and sharp they are used to make high-performance knives and scissors.
- 4 When powdered, zirconium can spontaneously ignite in air, making it an ingredient in some pyrotechnic devices.
- 5 It is chemically very similar to hafnium, and the two are extremely difficult to separate from each other.

APPEARANCE

Zirconium is a lustrous, grayish-white, strong metal.

SUPERHERO PERSONA

"The Nuclear Knight, a hero who can contain the immense power of a nuclear reactor."

EVERYDAY CONNECTION

Zirconium is found in the heat-resistant ceramic of a very sharp kitchen knife.

POP CULTURE

Zirconium is linked to the synthetic gemstone cubic zirconia, an imitation diamond.

Zirconium (Zr): The Nuclear and Ceramic Element

Zirconium is a hard, silvery metal that hardly ever rusts, even in harsh conditions. Its name comes from the gemstone zircon, where it was first discovered. Thanks to its strength and resistance to corrosion, zirconium is a key material in nuclear power and advanced ceramics.

Why Is Zirconium Useful?

Nuclear Reactors 🏗️: Over 90% of all zirconium is used in nuclear power stations to make the cladding for fuel rods. It's perfect for this role because it doesn't easily absorb neutrons, so the nuclear chain reaction continues efficiently. A single reactor may contain over 100,000 meters of zirconium alloy tubing!

Corrosion Resistance 🛡️: A natural oxide coating makes zirconium almost immune to acids, alkalis, and even seawater. This makes it vital for chemical industry equipment.

Advanced Ceramics 🏠: Zirconium(IV) oxide (ZrO₂), also known as cubic zirconia, is used to make ultra-tough ceramics for furnace linings, abrasives, and even kitchen knives.

Gemstones 💎: Natural zircon is a semi-precious gemstone, while cubic zirconia is a synthetic crystal that looks very much like a diamond.

Other Uses: Zirconium is also used in antiperspirants, cosmetics, food packaging, and in alloys with niobium that become superconductors, making them useful for powerful magnets.

Biological Role & Natural Abundance 🌱

Zirconium has no known biological role and is considered to have low toxicity.

It is found in about 30 different minerals, the most important being zircon and baddeleyite. Most zirconium is mined in Australia, South Africa, and Brazil, and the pure metal is produced by reducing zirconium chloride with magnesium.

History of Discovery 📖

1789 – Discovery: German chemist Martin Klaproth identified a new element in the mineral zircon, proving it contained a previously unknown substance.

1824 – Isolation: Swedish chemist Jöns Jakob Berzelius isolated zirconium as a black powder by heating potassium salts of zirconium with potassium metal.

1925 – Pure Metal: The first truly pure zirconium wasn't produced until over a century later.

⚡ From powering nuclear reactors to sparkling as a diamond look-alike, zirconium is an element that shows both industrial strength and dazzling beauty.