



### Key Properties

Atomic Mass	173.045
Category	Lanthanides
State at 20°C	solid
Melting Point	824°C
Boiling Point	1196°C
Density	6.9
Electron Config	[Xe] 4f146s2
Electronegativity	null
Year Discovered	1878
Discovered By	Jean Charles Galissard de Marignac

### Did You Know?

- 1 Some of the world's most accurate atomic clocks use ytterbium atoms. These clocks are so precise they would not lose or gain a second in billions of years.
- 2 It was the fourth element to be named after the small Swedish village of Ytterby, the source of the mineral from which it was first extracted.
- 3 When added to stainless steel, ytterbium improves its strength and other mechanical properties.
- 4 It has been used as a radiation source for portable X-ray machines, similar to thulium.
- 5 Under extremely high pressures, ytterbium, which is normally a metal, becomes a semiconductor.

#### APPEARANCE

Ytterbium is a soft, bright, silvery metal.

#### SUPERHERO PERSONA

"The Atomic Clockwork, a hero who helps keep time with almost perfect, unwavering precision."

#### EVERYDAY CONNECTION

Ytterbium is found in ultra-precise atomic clocks.

#### POP CULTURE

Ytterbium is the fourth element to be named after the same small Swedish village — Ytterby.

### Ytterbium (Yb): The Soft Metal of Lasers

Ytterbium is a soft, silvery metal that slowly tarnishes in air, forming a thin protective layer. It belongs to the lanthanide series (rare earth elements) and is best known for its role in lasers and high-tech optics. Its name comes from the Swedish village of Ytterby, which gave its name to several rare earth elements.

### Why Is Ytterbium Useful?

Ytterbium's special ability to absorb and emit light makes it a key player in modern technology:

**Lasers:** Ytterbium is used in surgical lasers for delicate procedures like eye surgery and microsurgery, as well as in industrial lasers for cutting and welding. It's also used in fiber amplifiers that boost signals in long-distance, high-speed telecommunications.

**Optical Clocks:** Ytterbium is used in some of the world's most accurate atomic clocks, which are important for quantum computing, GPS, and next-gen science. In fact, ytterbium clocks are so stable that they'd only lose about one second over the entire age of the universe!

**Alloys:** Adding ytterbium to stainless steel makes it stronger and more durable.

**Other Uses:** It's also being studied for use in memory storage, catalysts, and even in portable X-ray machines where it can act as a source of gamma rays.

### Biological Role & Natural Abundance

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

It is never found as a pure metal in nature but occurs in minerals such as monazite and xenotime. Extracting it requires complex chemical methods like ion exchange and solvent extraction.

### History of Discovery

**1878 – Discovery:** Swiss chemist Jean Charles Galissard de Marignac discovered ytterbium while analyzing a "single element" mineral that turned out to be a mix of rare earths. By carefully separating them, he found a new oxide containing the unknown element.

**1953 – Purification:** Early samples of ytterbium were impure. It wasn't until 1953 that scientists produced pure ytterbium metal for the first time.