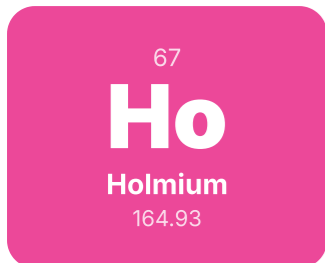


# Holmium (Ho)

Element 67 — Complete Summary

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## Key Properties

Atomic Mass	164.93
Category	Lanthanides
State at 20°C	solid
Melting Point	1472°C
Boiling Point	2700°C
Density	8.79
Electron Config	[Xe] 4f116s2
Electronegativity	1.23
Year Discovered	1878
Discovered By	Jacques-Louis Soret & Marc Delafontaine

## Did You Know?

- 1 Holmium holds the *record* for the highest magnetic moment of *any naturally occurring element*. Talk about a magnetic personality!
- 2 Its name, Holmium, is a cool nod to 'Holmia,' the Latin name for Stockholm, Sweden, the city where it was first truly identified!
- 3 Holmium oxide pulls a magical color-changing trick! It can look yellow-orange in natural light, but switch to a peachy-pink under fluorescent light. Wild!
- 4 Holmium-YAG lasers are surgical superheroes, used in incredibly precise operations, from breaking up kidney stones to delicate eye surgeries.
- 5 Because it's a neutron-gobbling champion, Holmium is sometimes used in nuclear reactor control rods to keep those atomic reactions perfectly balanced.
- 6 Its super-magnetic properties make it essential in cryocoolers, devices that help scientists reach and study ultra-low, super-chilly temperatures.
- 7 Holmium is one of the 'rare earth elements,' a special group known for their unique properties, even if they aren't super rare in the Earth's crust.
- 8 It was first glimpsed in 1878 by Swiss chemist Marc Delafontaine, but properly isolated and studied by Swedish chemist Per Teodor Cleve shortly after.
- 9 Unlike some elements crucial for life, Holmium doesn't have any known biological role in living organisms. It's busy with its magnetic adventures!
- 10 Despite its powerful magnetic abilities, pure Holmium metal is surprisingly soft and malleable, meaning you can easily shape it.
- 11 Scientists are constantly researching Holmium to unlock its full potential for future technologies, especially in advanced magnetic materials and data storage.
- 12 It's not super abundant, but you can still find it scattered in various minerals in the Earth's crust, patiently waiting to be discovered.

### APPEARANCE

A gleaming, silver-white metal, surprisingly soft and ductile.

### SUPERHERO PERSONA

*"The Elemental Master of Magnetism and Laser Precision, Holmium channels incredible magnetic force and pin-point laser accuracy to solve the universe's toughest challenges."*

### EVERYDAY CONNECTION

The secret ingredient in some cutting-edge medical lasers and super-strong laboratory magnets.

### POP CULTURE

Imagine if Magneto and Cyclops had an element baby – that's Holmium, combining magnetic might with laser precision!

## Overview of Holmium

Holmium is a bright, silvery rare earth metal with atomic number 67. Belonging to the lanthanide series, it is named after Holmia—the Latin name for Stockholm, Sweden—in honor of one of its discoverers. Holmium is malleable, reactive, and not often encountered in its pure form. Its most distinctive features are its extraordinary magnetic properties and its ability to absorb neutrons, which give it an important role in advanced technology.

## Uses of Holmium

Holmium's applications stem from its unique magnetic, optical, and nuclear properties:

**Nuclear reactors:** Holmium is an excellent neutron absorber, making it useful in control rods that regulate the fission chain reaction in nuclear reactors.

**Powerful magnets:** Holmium has the highest magnetic permeability of any element. When alloyed with metals like neodymium, it helps magnets resist demagnetization at high temperatures—critical for electric vehicle motors and wind turbines.

**Medical and industrial lasers:** Holmium-doped lasers are widely used in surgery, including lithotripsy (breaking down kidney stones) and HoLEP procedures for prostate treatment. They also play a role in military targeting systems and defense applications.

**Optical uses:** Holmium oxide has unusual color-changing properties, appearing yellow in daylight and reddish-orange under fluorescent light. It is used as a glass and ceramic colorant and as a calibration standard for optical spectrophotometers.

### ■ Natural Abundance and Production of Holmium

Holmium is never found as a pure metal in nature. Instead, it is present in small amounts in rare earth minerals such as monazite and bastnaesite.

Extraction: Holmium is separated from other lanthanides through ion-exchange and solvent-extraction techniques.

Commercial supply: It is typically produced as a by-product during the processing of other rare earth elements.

### ■ History of Holmium

1878 – Spectroscopic discovery: Swiss chemists Marc Delafontaine and Louis Soret in Geneva first detected holmium by its unique spectral lines.

1878 – Isolation: Independently, Swedish chemist Per Teodor Cleve in Uppsala successfully separated holmium oxide from erbium oxide, becoming the first to isolate the element in its compound form.

Naming: The name holmium comes from Holmia, the Latin name for Stockholm.

### ■ Biological Role of Holmium

Holmium has no known biological role in humans or animals and is considered non-toxic. Some studies suggest holmium salts may stimulate metabolism in certain organisms, but the underlying mechanisms remain unclear.