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Ho
Holmium
164.93

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 It has the highest magnetic strength (magnetic moment) of any naturally occurring element.
- 2 Because of its extreme magnetic properties, it is used to create the pole pieces for the most powerful static magnets, which help to concentrate the magnetic field.
- 3 When added to cubic zirconia, it gives the crystals a yellow or red color, creating imitation gemstones.
- 4 Holmium was discovered spectroscopically due to its unique set of sharp absorption lines; these lines are so sharp that they are used to calibrate optical spectrophotometers.
- 5 It is named after Holmia, the Latin name for the city of Stockholm, Sweden.

APPEARANCE

Holmium is a bright, soft, silvery-white metal.

SUPERHERO PERSONA

"The Magnetic Master, the hero with the most powerful natural magnetic force of all."

EVERYDAY CONNECTION

Holmium is found in the pole pieces of the strongest laboratory magnets.

POP CULTURE

Holmium is so strongly magnetic that it's used to concentrate magnetic fields in MRI machines.

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.

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