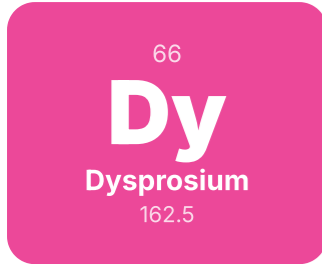


# Dysprosium (Dy)

Element 66 — Complete Summary  
theperiodictable.io



## Key Properties

Atomic Mass	162.5
Category	Lanthanides
State at 20°C	solid
Melting Point	1412°C
Boiling Point	2567°C
Density	8.54
Electron Config	[Xe] 4f106s2
Electronegativity	1.22
Year Discovered	1886
Discovered By	Paul-Émile Lecoq de Boisbaudran

## Did You Know?

- 1 Dysprosium's name comes from the Greek word 'dysprositos,' meaning 'hard to get' – a nod to how tricky it was for scientists to first isolate it!
- 2 Don't let its name fool you! While a 'rare earth' element, it's actually about as common in Earth's crust as tin, but extracting it is a whole different challenge.
- 3 This element is a magnetic superstar! It possesses one of the highest magnetic strengths of any element, especially when chilled to super-cold temperatures.
- 4 Ever wonder how tiny computer hard drives store so much data? Dysprosium is a key ingredient in their powerful magnets, crunching numbers at lightning speed!
- 5 It's an eco-hero! Dysprosium magnets are crucial for high-performance electric vehicle motors and massive wind turbines, helping us generate clean energy.
- 6 Think advanced tech! Dysprosium also plays a role in specialized lasers, helping them beam light with precision for everything from medical tools to scientific research.
- 7 In the heart of nuclear reactors, Dysprosium acts like a 'neutron sponge,' absorbing excess neutrons to control the nuclear chain reaction and keep things safe.
- 8 When alloyed with Terbium (another rare earth), it creates 'Terfenol-D,' a material that dramatically changes shape in a magnetic field – super useful for things like sonar!
- 9 Beyond its magnetic muscle, Dysprosium compounds can glow! They exhibit bright fluorescence under ultraviolet light, hinting at hidden visual talents.
- 10 First identified in 1886 by a French chemist, it remained a scientific puzzle for decades before pure Dysprosium could finally be isolated and studied.
- 11 Dysprosium is part of the 'lanthanide series,' a special group of elements often found chilling together in the same mineral deposits, making separation tough.
- 12 Adding a splash of Dysprosium to glass or ceramics can give them a cool, vibrant yellowish tint – adding flair to artistic and industrial designs.

### APPEARANCE

It's a bright, silvery-white metal that gleams with hidden strength.

### SUPERHERO PERSONA

"Meet 'Magnetic Dy', the elusive powerhouse of the periodic table! Hard to find, but once you do, its super-strong magnetic force can tame extreme temperatures and power our future."

### EVERYDAY CONNECTION

The super-strong magnet making your electric car zip and your phone's vibration motor hum.

### POP CULTURE

If Magneto from X-Men needed an elemental sidekick, Dysprosium would be his ultra-magnetic bestie!

## Overview of Dysprosium

Dysprosium is a bright, silvery lanthanide metal that reacts readily with air and water. While not widely known to the general public, dysprosium plays a critical role in modern technologies, particularly in renewable energy and electronics. Its name comes from the Greek word dysprositos, meaning "hard to obtain," reflecting the difficulty early chemists faced in isolating it.

## Uses of Dysprosium

The unique properties of dysprosium make it valuable in several cutting-edge applications:

**Magnets:** Dysprosium is alloyed with neodymium to make high-performance permanent magnets. It increases resistance to demagnetization at high temperatures, which is vital for wind turbines, electric vehicle motors, and industrial generators.

**Lighting:** Dysprosium iodide is used in high-intensity halide discharge lamps, producing a bright white light for stadiums, film production, and specialized lighting.

**Nuclear technology:** A dysprosium oxide-nickel composite (cermet) is used in nuclear reactor control rods, as it absorbs neutrons effectively while remaining dimensionally stable over time.

## Natural Occurrence and Production of Dysprosium

Although considered a “rare earth,” dysprosium is more abundant in Earth's crust than tin or lead. It is mainly extracted from monazite and bastnaesite ores.

Extraction involves complex separation techniques such as ion exchange and solvent extraction, followed by reduction of dysprosium trifluoride ( $\text{DyF}_3$ ) with calcium to obtain the pure metal.

### **History of Dysprosium**

1886 – Discovery: French chemist Paul-Émile Lecoq de Boisbaudran discovered dysprosium in Paris, after years of painstaking work separating rare earth elements.

1950 – Pure samples obtained: Reliable samples of pure dysprosium were not available until Frank Spedding and his team at Iowa State University developed ion-exchange chromatography, which allowed efficient separation of lanthanides.

### **Biological Role of Dysprosium**

Dysprosium has no known biological role. It is considered to have low toxicity, but like other lanthanides, it should be handled with care in industrial or laboratory settings.