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Al
Aluminium
26.982

Key Properties

Atomic Mass	26.982
Category	Post-Transition Metals
State at 20°C	solid
Melting Point	660.323°C
Boiling Point	2519°C
Density	2.7
Electron Config	[Ne] 3s23p1
Electronegativity	1.61
Year Discovered	1825
Discovered By	Hans Christian Ørsted

Did You Know?

- 1 In the mid-1800s, aluminium was more valuable than gold because it was extremely difficult to extract from its ore.
- 2 It is the most abundant metal in the Earth's crust, but it is never found in its pure form in nature.
- 3 Aluminium does not rust; it reacts with oxygen in the air to form a tough, transparent, protective layer of aluminium oxide on its surface.
- 4 Recycling one aluminium can saves enough energy to run a television for three hours.
- 5 The top of the Washington Monument is capped with a 100-ounce pyramid of pure aluminium, which was a symbol of wealth and modernity in 1884.

APPEARANCE

A silvery-white, lightweight, and non-magnetic metal.

SUPERHERO PERSONA

"The Modern Marvel, a lightweight hero who resists corrosion and is the champion of recycling."

EVERYDAY CONNECTION

The aluminum foil in your kitchen or the soda can you drink from.

POP CULTURE

Transparent aluminum was a futuristic material featured in 'Star Trek 4: The Voyage Home'.

Overview of Aluminum

Aluminum is a silvery-white, lightweight, and highly versatile metal. It is soft and malleable, yet when alloyed with other elements it becomes strong and durable. Aluminum is one of the most widely used metals on Earth, found in everything from beverage cans to airplane frames.

Why Aluminum Is So Useful

Several properties make aluminum a go-to material across many industries:

Lightweight: Its low density makes it essential in transportation (airplanes, trains, cars).

Strong alloys: Pure aluminum is relatively soft, but when alloyed with copper, magnesium, or silicon it forms lightweight yet strong materials.

Corrosion resistance: A protective layer of aluminum oxide naturally forms, shielding it from rust and corrosion.

Recyclability: Aluminum is economically recycled, saving significant energy compared to producing new metal.

Electrical conductivity: Aluminum conducts electricity well, and its low cost and light weight make it ideal for power lines.

Reflectivity: Aluminum coatings reflect both light and heat, useful in telescope mirrors, thermal insulation, and food packaging.

Natural Occurrence and Production of Aluminum

Aluminum is the most abundant metal in Earth's crust, making up about 8.1%. However, it is rarely found in pure form. Instead, it occurs in minerals such as bauxite and cryolite.

Commercial aluminum is produced mainly through the Hall-Héroult process, which uses electrolysis to extract pure aluminum from aluminum oxide. This process is energy-intensive but remains the dominant industrial method worldwide.

History of Aluminum

Ancient mystery: A 3rd-century Chinese ornament was found to contain 85% aluminum, though how it was made remains unexplained.

18th century: Chemists identified aluminum oxide but could not isolate the metal.

1825: Danish physicist Hans Christian Ørsted produced an impure sample of aluminum.

1827: German chemist Friedrich Wöhler improved the method and produced the first pure aluminum.

Biological Role of Aluminum

Aluminum has no known biological role in humans. It is toxic to many plants, particularly in acidic soils. Humans absorb small amounts from food and drink (such as tea or processed cheese), but most is excreted. Some studies have suggested a possible link between aluminum accumulation and conditions like Alzheimer's disease, though this connection remains unproven.

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