Cobalt (Co)

Element 27 — Complete Summary

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27
Co
Cobalt
58.933

Key Properties

Atomic Mass	58.933
Category	Transition Metals
State at 20°C	solid
Melting Point	1495°C
Boiling Point	2927°C
Density	8.9
Electron Config	[Ar] 3d74s2
Electronegativity	1.88
Year Discovered	1735
Discovered By	Georg Brandt

✨ Did You Know?

1. Its name comes from the German word 'kobold', which means 'goblin' or 'evil spirit', because miners in the Middle Ages found it would sicken them (due to arsenic in its ores) while yielding no valuable metal.
2. Cobalt is what gives the famous \
3. It is a critical component of Vitamin B12, the only vitamin known to contain a metal element.
4. Cobalt is used to create some of the strongest magnets in the world when alloyed with samarium or other rare earth elements.
5. The radioactive isotope Cobalt-60 is used to create gamma rays for sterilizing medical supplies and irradiating food.

APPEARANCE
Cobalt is a hard, brittle, silvery-blue magnetic metal.

SUPERHERO PERSONA
"The Blue Goblin, a hero who creates super-strong magnets and gives glass its beautiful deep blue color."

EVERYDAY CONNECTION
Cobalt is found in the deep blue color of a piece of glass art.

POP CULTURE
Cobalt is referenced in spy thrillers the radioactive isotope Cobalt-60 is often a component of a dirty bomb.

Overview of Cobalt

Cobalt is a hard, lustrous, silvery-blue transition metal that is both magnetic and durable. It plays a vital role in high-strength alloys, super-powerful magnets, and as a source of vivid blue pigments that have been prized for thousands of years. The element also has modern applications in medicine, electronics, and energy production.

Uses of Cobalt

Cobalt's physical and chemical properties make it valuable across multiple industries:

Magnets: Cobalt can be magnetized like iron. When combined with aluminum and nickel, it forms Alnico magnets, which are among the strongest permanent magnets available.

High-performance alloys: Cobalt alloys are used in jet turbine blades, gas turbines, and cutting tools, as they retain strength even at very high temperatures.

Color pigments: For centuries, cobalt salts have been used to produce the brilliant cobalt blue pigment in glass, ceramics, and paints.

Medical and industrial isotopes: Cobalt-60 emits gamma rays and is used in radiotherapy to treat cancer, sterilizing medical equipment, food irradiation, and as a tracer in research.

Electroplating: Cobalt provides a corrosion-resistant, attractive finish when used in electroplating metals.

Natural Occurrence and Production of Cobalt

Cobalt occurs in minerals such as cobaltite (CoAsS) and skutterudite ($CoAs_3$), but most commercial cobalt is obtained as a by-product of nickel and copper refining. Vast potential reserves also exist in manganese nodules on the ocean floor, though these are not yet exploited on a large scale.

History of Cobalt

Ancient pigment use: Cobalt compounds were used as blue colorants as early as ancient Egypt and China. A blue glass object containing cobalt was found in the tomb of Pharaoh Tutankhamun (14th century BC).

1739 – Discovery of the element: Swedish chemist Georg Brandt demonstrated that the intense blue color in glass came from a new element, not from bismuth or copper as previously thought. He named it cobalt, after the German word kobold ("goblin"), used by miners who considered cobalt ores troublesome because they often yielded no silver and released toxic fumes.

Biological Role of Cobalt

Cobalt is an essential trace element in humans and animals. It is a central component of vitamin B12 (cobalamin), which is required for red blood cell production and nervous system function. The body requires only trace amounts—around 1 mg in total. In excess, however, cobalt compounds can be toxic and carcinogenic.