Chromium (Cr)

Element 24 — Complete Summary

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24
Cr
Chromium
51.996

Key Properties

Atomic Mass	51.996
Category	Transition Metals
State at 20°C	solid
Melting Point	1907°C
Boiling Point	2671°C
Density	7.19
Electron Config	[Ar] 3d54s1
Electronegativity	1.66
Year Discovered	1797
Discovered By	Louis-Nicolas Vauquelin

✨ Did You Know?

1. Its name comes from the Greek word 'chroma', meaning 'color', because its compounds are known for being intensely colorful (e.g., ruby red, emerald green, chrome yellow).
2. Stainless steel gets its resistance to rust and corrosion from the addition of at least 10.5% chromium.
3. Rubies get their deep red color from trace amounts of chromium ions in their crystal structure.
4. The shiny, reflective coating on car bumpers and fixtures is an extremely thin layer of plated chromium.
5. While the chromium(III) ion may be an essential nutrient, the chromium(VI) form is highly toxic and carcinogenic.

APPEARANCE
A hard, lustrous, steel-gray metal.

SUPERHERO PERSONA
"The Chrome Comet, a flashy hero who resists tarnish and gives everything a mirror-like shine."

EVERYDAY CONNECTION
The shiny chrome bumper on a classic car.

POP CULTURE
The shiny, metallic aesthetic is a staple of retro-futurism.

Overview of Chromium

Chromium is a hard, silvery transition metal with a faint bluish tint. It is best known as a key ingredient in stainless steel, where it prevents rust and provides strength. Its name comes from the Greek word chroma (“color”), reflecting the vivid range of hues produced by its compounds—from ruby red to emerald green.

Uses of Chromium

Chromium’s durability, resistance to corrosion, and colorful compounds give it a wide range of applications:

Alloys and plating: Chromium is added to steel to create stainless steel, which is resistant to rust and corrosion. It is also used for chromium plating, producing a shiny, mirror-like finish on car parts, household fixtures, and plastics.

Pigments and gemstones: Chromium compounds are used in paints, ceramics, and glass to create bright red, green, and yellow pigments. The red of rubies and the green of emeralds are both caused by chromium impurities.

Leather tanning: About 90% of leather is treated with chromium salts, which help preserve and strengthen hides. Due to environmental concerns, alternative tanning methods are being explored.

Refractories and chemicals: Chromium compounds are used in refractory bricks, catalysts, and wood preservatives.

Natural Occurrence and Production of Chromium

Chromium occurs mainly in the mineral chromite ($FeCr_2O_4$), with major deposits in South Africa, India, Kazakhstan, and Turkey. Commercially, chromium is produced by:

Reducing chromite ore with carbon in an electric arc furnace.

Reducing chromium(III) oxide with aluminum in a process known as the thermite reaction.

History of Chromium

1797–1798 – Discovery: French chemist Nicolas-Louis Vauquelin analyzed a bright red mineral from Siberia, crocoite (lead chromate). He isolated chromium oxide and later prepared metallic chromium by reduction.

Naming: Vauquelin named the element chromium because of the wide variety of brightly colored compounds it formed. He also later identified chromium as the source of emerald’s green color.

Biological Role of Chromium

Chromium is an essential trace element in humans. It plays a role in regulating blood sugar by enhancing the action of insulin. The small amounts we need are obtained from foods such as whole grains, nuts, and brewer’s yeast. In contrast, high concentrations of certain chromium compounds—particularly hexavalent chromium (Cr(VI))—are toxic and carcinogenic.