Stable isotopes of chromium available from ISOFLEX

Isotope	Z(p)	N(n)	Atomic Mass	Natural Abundance	Enrichment Level	Chemical Form
Cr-50	24	26	49.946049	4.35%	96.50-99.70%	Metal
Cr-50	24	26	49.946049	4.35%	94.50-99.70%	Oxide
Cr-52	24	28	51.940512	83.79%	≥98.80%	Metal
Cr-52	24	28	51.940512	83.79%	≥98.80%	Oxide
Cr-53	24	29	52.940653	9.50%	92.80-97.70%	Metal
Cr-53	24	29	52.940653	9.50%	92.80-97.70%	Oxide
Cr-54	24	30	53.938885	2.36%	>99.00%	Metal
Cr-54	24	30	53.938885	2.36%	>99.00%	Oxide

Chromium was discovered in 1797 by Louis-Nicolas Vauquelin. It is named for the Greek word *chroma*, meaning "color," signifying the strong and varied colors of chromium compounds.

Chromium is a hard, brittle, blue-white metal, with a body-centered cubic crystal. It exists in active and passive forms, the latter giving rise to its corrosion resistance due to a thin surface oxide layer that passivates the metal when treated with oxidizing agents. The active form reacts readily with dilute acids to form chromous salts. It is soluble in acids (except nitric) and strong alkalies, but insoluble in water.

Elemental chromium reacts with anhydrous halogens, hydrogen fluoride and hydrogen chloride, forming the corresponding chromium halides. At elevated temperatures in the 600-700 ºC range, chromium reacts with hydrogen sulfide or sulfur vapor, forming chromium sulfides. Chromium metal reacts at 600-700 ºC with sulfur dioxide and caustic alkalis. It combines with phosphorus at 800 ºC. Reaction with ammonia at 850 ºC produces chromium nitride. Reaction with nitric oxide forms chromium nitride and chromium oxide.

The most important application of chromium is in the production of steel. High-carbon and other grades of ferro-chromium alloys are added to steel to improve mechanical properties, to increase hardening and to enhance corrosion resistance. Chromium also is added to cobalt- and nickel-based alloys for the same purposes. Refractory bricks are composed of chromium oxides and are used in roofs of open hearths, sidewalls of electric furnaces, vacuum apparati and copper converters. Chromium coatings are applied on the surfaces of other metals — for decorative purposes, to enhance resistance, and to lower the coefficient of friction. Radioactive Chromium-51 is used as a tracer in the diagnosis of blood volume.

Hexavalent chromium compounds have an irritating and corrosive effect on human tissue, resulting in ulcers and dermatitis on prolonged contact. Tolerance for chromium dust and fume is 0.5 mg/m^3 of air. Hexavalent chromium is also a known carcinogen and is moderately toxic and corrosive to skin. Inhalation of Cr^{6+} dust or mist can cause perforation of the nasal septum, lung irritation, and congestion of the respiratory tract.

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Isotopes for Science, Medicine and Industry

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Properties of Chromium

Name	Chromium
Symbol	Cr
Atomic number	24
Atomic weight	51.996
Standard state	Solid at 298 °K
CAS Registry ID	7440-47-3
Group in periodic table	6
Group name	None
Period in periodic table	4
Block in periodic table	d-block
Color	Silvery metallic
Classification	Metallic
Melting point	1875 °C
Boiling point	2672 °C
Thermal conductivity	93.90 W/(m·K) at 298.2 °K
Electrical resistivity	12.90 μΩ·cm at 0 °C
Electronegativity	1.6
Specific heat	448 J/kg K
Heat of vaporization	339 $kJ \cdot mol^{-1}$
Heat of fusion	20.50 $kJ \cdot mol^{-1}$
Density of solid	7.14 g/cm^3
Electron configuration	$[Ar]3d^5 4s^1$
Atomic radius	1.27 Å
Oxidation states	-2, -1, +1, +2, +3, +4, +5, +6

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