

Cobalt ${}_{27}\text{Co}^{58.933}$

Discovered in 1735 by Georg Brandt at Stockholm, Sweden.

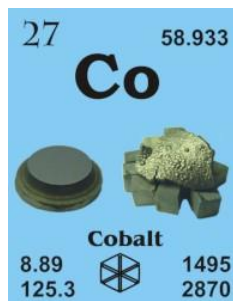
[German: kobald = goblin]

French: cobalt

German: Cobalt

Italian: cobalto

Spanish: cobalto



Atomic number	27
Density in g/cm ³	8.89
Atomic radius in pm	152
Atomic weight	58.933
Melting point in °C	1495
Boiling point in °C	2870

Description: Cobalt is a lustrous, silvery-blue, hard metal which is also ferromagnetic. It is stable in air, unaffected by water, but slowly attacked by dilute acids. ${}^{60}\text{Co}$ is a useful radioisotope. Cobalt is used in alloys for magnets, in ceramics, in catalysts and in paints.

COBALT SINGLE CRYSTAL PROPERTIES

State:	Single crystal
Crystal structure:	hexagonal
Production method:	Czochralski
Standard size:	diameter 8-10mm thickness 1-2mm
Orientation:	(0001), (1-100) and (11-20)
Orientation accuracy:	<2°, <1°, <0.4° or <0.1°
Polishing:	as cut, one or two sides polished
Roughness of surface:	<0.03 μm
Purity:	99.99%
	Ag 0.3
	Al 0.42
	As 2.2
	C 5.5
	Ca 0.08
	Cl 0.27
	Cu 0.46
	Cr 5.9
	Fe 17
	Mg 0.76
	Mn 0.07
	Mo < 0.1
	N 0.24
	Na 0.44
	Ni 22
	O 11.0

Typical analysis (ppm):



	S 1.3
	Si 2.9
	Ti 1.1
	Zn 0.2
	Co balance
Crystal structure:	(cell dimensions/pm), space group, α -Co f.c.c. ($a=354.41$), Fm3m α -Co h.c.p. ($a=250.7$, $c=406.9$), P63/mmc ($a \rightarrow e$)=690 K
X-ray diffractions mass absorption coefficients:	CuK α 313 ($\mu/\text{cm}^2\text{g}^{-1}$) MoK α 42.5 ($\mu/\text{cm}^2\text{g}^{-1}$)
Neutron scattering length:	0.278 b/10 ⁻¹² cm
Thermal neutron capture cross-section:	37.2 μa / barns
Density:	8.9 kg/m ⁻³ [293 K]; 2390 [liquid at m.p.]
Melting point:	1494.85 °C / 1768 °K
Boiling point:	2869.85 °C / 3143 °K
Molar volume:	6.62 cm ³
Thermal conductivity:	100 [300 K] Wm ⁻¹ K ⁻¹
Coefficient of linear thermal expansion:	13.36 x 10 ⁻⁶ K ⁻¹
Electrical resistivity:	6.24x10 ⁻⁸ [293 K] Ωm
Mass magnetic susceptibility:	ferromagnetic
Young's modulus:	211 GPa
Rigidity modulus:	82 GPa
Bulk modulus:	181.5 GPa
Poisson's ratio:	0.32
Radi:	Co ³⁺ 57; Co ²⁺ 82; atomic 125; covalent 116
Electronegativity:	1.88 (Pauling); 1.70 (Allred); 4.3 eV (absolute)
Effective nuclear charge:	3.90 (Slater); 5.58 (Clementi); 7.63 (Froese-Fischer)
Number of Isotopes (incl. nuclear isomers):	17
Isotope mass range:	35 -> 64

