



>>Entry Name: Cobalt

CAS Registry Number: 7440-48-4

Related CAS Registry Numbers(s): 16610-75-6 22541-53-3 22541-63-5

Co

Molecular Formula: Co

Molecular Weight: 58.933

Accurate Mass: 58.933198

Percentage Composition: Co 100.00%

General Statement: Atomic No. 27. Ground state electron config. $[\text{Ar}]3d^74s^2$. Compds. known to Middle East ancient civilisations 3000-2000 BC. Isol. in impure form by G. Brandt in 1735. There are 14 isotopes of which only 1 is natural, ^{59}Co . Abundance: 29 ppm (earth's crust), 5×10^{-5} ppm (sea water). Polymorphic. Hcp struct. (α -Co) slowly converts into the β -form (fcc) at 417° , but both forms stable at r.t.

Source/Synthesis: Few minerals of commercial importance, but include, smaltite (CoAs_2), cobaltite (CoAsS), and linnaeite (Co_3S_4), with some oxides. Manner of treatment depends on type and locality

Use/Importance: Essential trace element (Vitamin B_{12}). Used in magnetic alloys, ceramics and paint industries. Catalyst for hydrogenations. Radioactive ^{60}Co is conc. source of γ -radiation, with medical uses

Physical Description: Hard, lustrous, silvery-blue metal

Melting Point: Mp 1495°

Boiling Point: Bp 3100° (2870°)

Other Data: Magnetic to 1125° . Stable in air. Slowly attacked by dil. acids. Less reactive than Fe. When heated, reacts with halogens, B, C, P, As, O, and S. Unreactive to H_2 and to N_2

Hazard & Toxicity: Finely divided metal may ignite spont. in air

Aldrich: 26670-1

Fluka: 60782

>>Variant: Cobalt 54

CAS Registry Number: 14833-17-1

General Statement: Radioactive, $t_{1/2}$ 0.193 s

Source/Synthesis: Prod. from ^{54}Fe (p,n)

Other Data: $I = +0$. Decays by orbital electron capture or $\beta^{(+)}$ emission to ^{54}Fe

>>Variant: Cobalt 54m

General Statement: Radioactive, $t_{1/2}$ 1.46 min.

Source/Synthesis: Prod. from ^{54}Fe (p,n), or ^{54}Fe (d,2n)

Other Data: $I = +7$. Decays by orbital electron capture or $\beta^{(+)}$ emission to ^{54}Fe

>>Variant: Cobalt 55

CAS Registry Number: 13982-25-7

General Statement: Radioactive, $t_{1/2}$ 17.53 h

Source/Synthesis: Prod. from ^{54}Fe (d,n), ^{54}Fe (p, γ), or ^{56}Fe (p,2n)

Other Data: $I = -7/2$; $\mu = 4.822 \mu_N$. Decays by orbital electron capture or $\beta^{(+)}$ emission to ^{55}Fe

>>Variant: Cobalt 56

CAS Registry Number: 14093-03-9

General Statement: Radioactive, $t_{1/2}$ 77.7 d

Source/Synthesis: Prod. from ^{56}Fe (p,n), ^{55}Mn (α ,3n), ^{56}Fe (d,2n), or ^{58}Ni (d, α). Daughter of ^{56}Ni

Other Data: $I = +4$; $\mu = 3.85 \mu_N$. Decays by orbital electron capture or $\beta^{(+)}$ emission to ^{56}Fe

>>Variant: Cobalt 57

CAS Registry Number: 13981-50-5

General Statement: Radioactive, $t_{1/2}$ 271.8 d

Source/Synthesis: Prod from ^{56}Fe (d,n), ^{56}Fe (p, γ), ^{55}Mn (α ,2n), or by γ irradiation of ^{58}Ni

Use/Importance: Used in diagnostic nuclear medicine

Other Data: $I = -7/2$; $\mu = +4.72 \mu_N$. Decays by orbital capture to ^{57}Fe