

Main uses of cobalt

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Today, some cobalt is produced specifically from one of a number of metallic-lustered ores, such as cobaltite (CoAsS). The element is more usually produced as a by-product of copper and nickel mining. The Copperbelt in the Democratic Republic of the Congo (DRC) and Zambia yields most of the global cobalt production. World production in 2016 was 116,000 tonnes (114,000 long tons; 128,000 short tons) (according to Natural Resources Canada), and the DRC alone accounted for more than 50%.

Cobalt is the active center of a group of coenzymes called cobalamins. Vitamin B12, the best-known example of the type, is an essential vitamin for all animals. Cobalt in inorganic form is also a micronutrient for bacteria, algae, and fungi.

The name cobalt derives from a type of ore considered a nuisance by 16th century German silver miners, which in turn may have been named from a spirit or goblin held superstitiously responsible for it; this spirit is considered equitable to the kobold (a household spirit) by some, or, categorized as a gnome (mine spirit) by others.

Four dihalides of cobalt(II) are known: cobalt(II) fluoride (CoF_2 , pink), cobalt(II) chloride (CoCl_2 , blue), cobalt(II) bromide (CoBr_2 , green), cobalt(II) iodide (CoI_2 , blue-black). These halides exist in anhydrous and hydrated forms. Whereas the anhydrous dichloride is blue, the hydrate is red.

The inventory of complexes is very large. Starting with higher oxidation states, complexes of Co(IV) and Co(V) are rare. Examples are found in caesium hexafluorocobaltate(IV) (Cs_2CoF_6) and potassium percobaltate (K_3CoO_4).

Cobalt(II) forms a wide variety of complexes, but mainly with weakly basic ligands. The pink-colored cation hexaaquacobalt(II) $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$ is found in several routine cobalt salts such as the nitrate and sulfate. Upon addition of excess chloride, solutions of the hexaaquo complex converts to the deep blue CoCl_4^{2-} , which is tetrahedral.

Softer ligands like triphenylphosphine form complexes with Co(II) and Co(I), examples being bis- and tris(triphenylphosphine)cobalt(I) chloride, $\text{CoCl}_2(\text{PPh}_3)_2$ and $\text{CoCl}(\text{PPh}_3)_3$. These Co(I) and Co(II) complexes represent a link to the organometallic complexes described below.

The isotopes of cobalt range in atomic weight from 50 u (^{50}Co) to 73 u (^{73}Co). The primary decay mode for isotopes with atomic mass unit values less than that of the only stable isotope, ^{59}Co , is electron capture and the primary mode of decay in isotopes with atomic mass greater than 59 atomic mass units is beta decay. The primary decay products below ^{59}Co are element 26 (iron) isotopes; above that the decay products are element 28 (nickel) isotopes.

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