

This fact sheet answers the most frequently asked health questions (FAQs) about cobalt. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**HIGHLIGHTS:** The general population is exposed to low levels of cobalt in air, water, and food. Cobalt has both beneficial and harmful effects on health. At low levels, it is part of vitamin B12, which is essential for good health. At high levels, it may harm the lungs and heart. This chemical has been found in at least 426 of the 1,636 National Priorities List sites identified by the Environmental Protection Agency (EPA).

### What is cobalt?

Cobalt is a naturally occurring element found in rocks, soil, water, plants, and animals. Cobalt is used to produce alloys used in the manufacture of aircraft engines, magnets, grinding and cutting tools, artificial hip and knee joints. Cobalt compounds are also used to color glass, ceramics and paints, and used as a drier for porcelain enamel and paints.

Radioactive cobalt is used for commercial and medical purposes. <sup>60</sup>Co (read as cobalt sixty) is used for sterilizing medical equipment and consumer products, radiation therapy for treating cancer patients, manufacturing plastics, and irradiating food. <sup>57</sup>Co is used in medical and scientific research. It takes about 5.27 years for half of <sup>60</sup>Co to give off its radiation and about 272 days for <sup>57</sup>Co; this is called the half-life.

### What happens to cobalt when it enters the environment?

- Cobalt enters the environment from natural sources and the burning of coal or oil or the production of cobalt alloys.
- In the air, cobalt will be associated with particles that settle to the ground within a few days.
- Cobalt released into water or soil will stick to particles. Some cobalt compounds may dissolve.
- Cobalt cannot be destroyed. It can change form or attach to or separate from particles. Radioactive decay is a way of

decreasing the amount of radioactive cobalt in the environment.

### How might I be exposed to cobalt?

- You can be exposed to low levels of cobalt by breathing air, eating food, or drinking water. Food and drinking water are the largest sources of exposure to cobalt for the general population.
- Working in industries that make or use cutting or grinding tools; mine, smelt, refine, or process cobalt metal or ores; or that produce cobalt alloys or use cobalt.
- The general population is rarely exposed to radioactive cobalt unless a person is undergoing radiation therapy. However, workers at nuclear facilities, irradiation facilities, or nuclear waste storage sites may be exposed to radiation from these sources.

### How can cobalt affect my health?

Cobalt can benefit or harm human health. Cobalt is beneficial for humans because it is part of vitamin B12.

Exposure to high levels of cobalt can result in lung and heart effects and dermatitis. Liver and kidney effects have also been observed in animals exposed to high levels of cobalt.

Exposure to large amounts of radiation from radioactive cobalt can damage cells in your body from the radiation.

ToxFAQs™ Internet address is <http://www.atsdr.cdc.gov/toxfaq.html>

You might also experience acute radiation syndrome that includes nausea, vomiting, diarrhea, bleeding, coma, and even death. This would be a rare event.

### How likely is cobalt to cause cancer?

Nonradioactive cobalt has not been found to cause cancer in humans or animals following exposure in food or water. Cancer has been shown, however, in animals that breathed cobalt or when cobalt was placed directly into the muscle or under the skin. Based on the laboratory animal data, the International Agency for Research on Cancer (IARC) has determined that cobalt and cobalt compounds are possibly carcinogenic to humans.

Exposure to high levels of cobalt radiation can cause changes in the genetic materials within cells and may result in the development of some types of cancer.

### How can cobalt affect children?

We do not know whether children differ from adults in their susceptibility to cobalt. However, it is likely that health effects in children would be similar those in adults. Studies in animals suggest that children may absorb more cobalt than adults from foods and liquids containing cobalt.

We do not know if exposure to cobalt will result in birth defects or other developmental effects in people. Birth defects have been observed in animals exposed to nonradioactive cobalt. Exposure to cobalt radiation can also result in developmental effects.

### How can families reduce the risk of exposure to cobalt?

Children should avoid playing in soils near hazardous waste sites where cobalt may be present.

### Is there a medical test to show whether I've been exposed to cobalt?

Cobalt levels can be tested in the urine and blood within a couple of days of exposure. Your doctor can take samples,

but must send them to a laboratory to be tested. The amount of cobalt in your blood or urine can be used to estimate how much cobalt you were exposed to. However, these tests cannot predict whether you will experience any health effects.

Two types of tests are available for radioactive cobalt. One is to see if you have been exposed to a large dose of radiation, and the other is to see if radioactive cobalt is in your body. The first looks for changes in blood cell counts or in your chromosomes that occur at 3 to 5 times the annual occupational dose limit. It cannot tell if the radiation came from cobalt. The second type of test involves examining your blood, feces, saliva, urine, and even your entire body. It is to see if cobalt is being excreted from or remains inside your body. Either the doctor's office collects and sends the samples to a special lab for testing, or you must go to the lab for testing.

### Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.1 milligrams of nonradioactive cobalt per cubic meter of workplace air (0.1 mg/m<sup>3</sup>) for an 8-hour workday and 40-hour work week.

The Nuclear Regulatory Commission limits radioactive cobalt in workplace air to 1x10<sup>-5</sup> microcurie per milliliter (μCi/mL) for <sup>57</sup>Co and 7x10<sup>-8</sup> μCi/mL for <sup>60</sup>Co. EPA has set an average annual drinking water limit of 1000 picocurie per liter (pCi/L) for <sup>57</sup>Co or 100 pCi/L for <sup>60</sup>Co so the public radiation dose will not exceed 4 millirem.

### Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2004. Toxicological Profile for Cobalt Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

