

# Toxic Metals in Environment

## Introduction

Toxic metals are metals that are harmful to people's health. In very small amounts, these metals may be necessary to support life. However, in larger amounts, they are toxic. They may build up in biological systems and become health hazards. Below is a list of toxic metals, found in living and occupational environments (listed in alphabetical order):

- Arsenic (As)
- Beryllium (Be)
- Cadmium (Cd)
- Chromium (Cr)
- Lead (Pb)
- Mercury (Hg)

## Arsenic

Arsenic poisoning can be caused for three main reasons: drinking arsenic contaminated water, occupational exposure, and ingestion of arsenic contaminated food. Arsenic can occur naturally in drinking water in wells around the world. A limit of 0.01 mg/L of Arsenic in drinking water is recommended by WHO. Occupational exposure to Arsenic can occur in wood preservation, glass production, nonferrous metal alloys, electronic semiconductor manufacturing, and in the smelter industry. Arsenic can be found in high levels in rice. Arsenic levels can be measured in blood and urine for diagnosis. Hair is also an indicator for arsenic due to its accumulation. Chronic arsenic exposure causes arrhythmias, cardiovascular dysfunction and atherosclerosis, and clinical picture similar to thiamine deficiency.

## Beryllium

Excess exposure of Beryllium can cause acute or chronic berylliosis. It can be caused by inhalation of Beryllium or implantation of Beryllium in the skin. Acute berylliosis has a rapid onset and is characterized by severe pneumonitis, coughing, and dyspnea. The skin of eyes may be affected. The chronic form is more common. It develops more slowly and may not become evident for many years after initial beryllium exposure. Chronic berylliosis is characterized by the abnormal formation of granulomas in tissues and organs and fibrosis in the lungs. Granulomas are found mainly in the lungs but can also be found in the liver, skin and subcutaneous tissue. Symptoms include dry cough, fatigue, weight loss, chest pain and dyspnea. Beryllium compounds were found in fluorescent lighting before 1949. Exposure to beryllium can occur in the nuclear and aerospace industries, refining of beryllium metal, melting of beryllium-containing alloys, and manufacturing of electronic devices.

## Cadmium

Cadmium is a very toxic metal. It is commonly found in industrial workplaces, especially where ore is being processed or smelted. It has a very low permissible exposure limit (PEL). Overexposures may occur even in situations where trace quantities of cadmium are found in the parent ore or smelter dust. Exposures to cadmium can occur in the general industry, shipyard employment, construction industry, and the agricultural industry. Cadmium is used extensively in electroplating, but this does not usually lead to overexposure. Several deaths from acute exposure have occurred in welders who welded on cadmium-containing alloys or worked with silver solders. Cadmium is found in some industrial paints and may be a hazard when sprayed. Removal of cadmium paint by scraping or blasting may also be a hazard. Cadmium is also present in the manufacture of some types of batteries.

## Chromium

Hexavalent Chromium is considered a health hazard. Water insoluble Chromium compounds are not considered a health hazard. Overexposure to chromium can occur in a welders and workers in the metallurgical industry, people taking chromium-containing dietary supplements, patients who received metallic surgical implants and individuals who ingest chromium salts Chromium compounds were used in dyes, paints, and the tanning of leather. They are found in soil and water at abandoned industrial sites. These sites now require cleaning and treatment. Hexavalent chromium is still used for aerospace and refinishing applications. Chromium concentrations of chromium in blood or urine can be monitored for diagnostic purposes. The toxicity of hexavalent chromium is due to strong oxidative properties. It damages the kidneys, the liver and blood cells through oxidation reactions. Aggressive dialysis is indicated in affected patients.

## Lead

Exposure routes of lead include occupational exposure, paint, soil, water, lead containing products, and hunting. The main tool for diagnosis is lead blood levels. X-ray in children and clinical symptoms can aid in diagnosis. Lead causes a wide variety of symptoms in both adults and children. It affects the central nervous system, peripheral nervous system, hearing, vision, muscular system, digestive system, renal function and blood. In children it can affect growth, cognitive development and behavior, and it can cause toxicity to the fetus in pregnant women. A very large variety of occupations is associated with lead overexposure. Occupations involving the following are at high risk: smelting or casting lead, removing lead coatings, heating, machining, or spraying lead products, and making lead products.

## Mercury

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## Links

## Bibliography

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