



What you should know about molybdenum

What is molybdenum?

Molybdenum is a hard, silver-white metal that is widely distributed in the environment found mainly in nature as molybdenum disulfide in the ore molybdenite. Molybdenum may be released to the environment by the combustion of fossil fuels, waste waters from industrial processes, the transportation of ores, and distribution of sewage. Molybdenum is a common by-product of tungsten and copper mining.



Iron and steel manufacturers use more than 75% of produced molybdenum in the production of steel, cast-iron, and super-alloys. These steel and molybdenum alloys provide enhanced strength, durability, hardness, corrosion resistance, and ability to withstand extreme heat. Molybdenum is also significantly



used as a refractory metal in high temperature applications, as a catalyst in petroleum refining, as a wear-resistant coating for machine and engine parts, as a lubricant, and as a pigment.

Few of its uses have a suitable substitution. Molybdenum is used to soften tungsten alloys (mixture of metal), to make light bulb filaments, rifle barrels, engine anti-freeze, and missile and aviation parts.

Molybdenum is an essential element to all plant and animal species and as it is an essential plant nutrient it is used in plant food and fertilizers. Some foods such as lentils, whole grains, cauliflower, green peas and spinach naturally contain molybdenum. Although small amounts of molybdenum are essential to human health large amounts can be toxic.

What happens to molybdenum in the environment?

- * The production and use of molybdenum compounds as catalysts, lubricants, corrosion inhibitors, flame retardants and smoke suppressants, and pigments, may result in its release to the environment through various waste streams.
- * In the air it attaches to small dust particles which settle on the ground and attach to soil or sediment.
- * When it rains small particles of molybdenum in air or soil can be washed into surface water by runoff.
- * Once molybdenum enters a water body it can attach to sediment and be consumed by fish.
- * Because molybdenum attaches to soil, it can be found in agricultural products used for human and/or livestock consumption.
- * Geographic regions where soil tends to be more acidic may have higher levels of molybdenum because molybdenum does not dissolve very well in acidic soils.



How might I be exposed to molybdenum?

- * Occupational exposure to molybdenum compounds may occur through inhalation and dermal contact at workplaces where molybdenum or molybdenum compounds are produced or used.
- * As molybdenum occurs naturally in the environment as molybdenite, the general public can be exposed to small amounts of molybdenum in the air or by eating food or drinking water.
- * The most common source of exposure to molybdenum is by eating foods such as legumes (beans, peas, lentils, etc.), nuts, grains, leafy vegetables, cauliflower, liver, and nuts.
- * Others may come into contact with molybdenum containing dust carried on the clothes of workers occupationally exposed to molybdenum.
- * Workers using an electroplating process may be exposed to dusts and fumes containing molybdenum.



How can molybdenum affect my health?



The effects of exposure to any substance depend on the type of exposure, concentration of the substance, and the length of time of exposure. Additional factors that must be considered are age, gender,

diet, family traits, lifestyle, and health status. Molybdenum is an essential element in human nutrition necessary for processing amino acids.

Inhalation of molybdenum fumes and dust may cause irritation of the eyes and the mucous membranes. Skin contact with molybdenum dust can cause irritation.

People who ingest 10-15 milligrams/per day (mg/day) of molybdenum, for prolonged periods of time, may develop hyperuricemia (an increase of uric acid in the blood) or Gout-like symptoms. Molybdenum toxicity rarely occurs as it would require ingesting a dose of greater than 100 milligrams/per kilogram body weight (mg/kg) in order to begin seeing symptoms of molybdenum toxicity.

Molybdenum toxicity is directly related to the amount of copper stored in the body. If someone does not have an adequate amount of copper in their bodies that person could be at greater risk of molybdenum toxicity. In some instances it has been noted that ingesting an excessive amount of molybdenum could cause a copper deficiency making the person more susceptible to molybdenum toxicity. Molybdenum is used to treat rare inherited metabolic diseases, such as Wilson's disease, which prohibits the body from eliminating copper.

Water-soluble (dissolves in water) molybdenum compounds are readily taken up through the lungs and gastrointestinal tract; but insoluble (cannot be dissolved) compounds are not. Following absorption, molybdenum is spread throughout the body with the highest levels generally found in the liver, kidneys, spleen, and bone. In persons with impaired lung function, especially those with obstructive airway diseases, the breathing of insoluble molybdenum compounds might worsen symptoms due to their irritant properties.

Some mining and metallurgy workers may have an increased incidence of nonspecific symptoms, including weakness, fatigue, headache, anorexia, and joint and muscle pains. Chronic exposure to high (occupational) levels may increase the risk of developing lung cancer.

How can I reduce my exposure to molybdenum?

Special measures are not needed to reduce exposure, one can reduce exposure to molybdenum simply by:

- * Washing hands and faces before eating if you have been outdoors.
- * Covering contaminated soil with clean soil or sod, paving stone, or a deck.
- * Cleaning your home regularly with a damp mop/cloth.
- * Using removable rugs at entry points to the home and cleaning them outside to reduce dust getting into the house.
- * Brushing indoor pets often and outside if possible to reduce dust particles carried into the home.
- * Thoroughly cleaning garden vegetables and peeling the outer skin from root crops.