



## MANGANESE

### What is Manganese?

Manganese is a naturally occurring element found in many kinds of rocks. Pure manganese is a silver-colored metal that becomes pure metal by forming compounds with oxygen, sulfur, chlorine and other substances.

### Where is manganese found and how is it used?

Manganese is found in many kinds of rocks. Since some manganese compounds dissolve in water, low levels are normally found in lakes, streams and oceans. Industries mix manganese with iron to make different types of steel. Some manganese compounds are used to manufacture batteries, ceramics, pesticides and fertilizers.

### How can people be exposed to manganese?

Manganese is a part of the environment. People are exposed to low levels in air, water, soil and food. For most people, food is the main source of manganese exposure. As an essential trace element, manganese is needed for good health.

*You could be exposed to manganese through:*

**Breathing** dust or fumes containing manganese if working in a factory where manganese compounds are used.

**Touching** it if you use pesticides containing manganese.

### How does manganese work and how can it affect my health?

Exposure to high levels of manganese oxide fumes can cause "metal fume fever." Symptoms do not appear right away, but usually within six months to a year after repeated exposure. Metal fume fever causes flu-like sickness. Initial symptoms including having a metal taste in your mouth, fever and chills, aches, chest tightness and cough. Other symptoms are loss of appetite, weakness or sleeplessness.

Later symptoms include changes in speech, balance, mood and personality, loss of facial expression, poor muscle control, muscle cramps, twitching and tremors. The later symptoms resemble Parkinson's disease. Repeated and high exposure can result in permanent lung, brain and liver damage, and may cause anemia. Anemia is a disease where there is a lower than normal number of red blood cells in the blood.

Manganese uptake via inhalation is of greater concern for toxicity than uptake via ingestion. Manganese can be found in ambient air, though it is generally not at levels of concern for exposure. However, air concentrations can be of higher concern near industries processing or using manganese (e.g., mining operations, metal processing plants, coke ovens, power plants, and certain pesticide producers).

### How is manganese poisoning treated?

Manganese poisoning is treated by removing the exposed person from the source of exposure. There is not enough data to know if nervous system damage caused by long-term exposure can be reversed.



### What should I do if exposed to manganese?

If you think you were exposed to high levels of manganese, see your doctor.

### What factors limit use or exposure to manganese?

Enclose areas and use local exhaust ventilation at the site of chemical release. Wear respirators if the worksite cannot provide local exhaust ventilation. Wear protective work clothing. Wash well following exposure to manganese, and wash again at the end of each shift.

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

Manganese can be measured in blood and urine as long as tests are done immediately following exposure, since manganese leaves the body quickly. A doctor may examine the nervous system or order a complete blood count and lung function test.

### Technical information for manganese

CAS Number: 7439-96-5

Chemical Formula: Mn

Carcinogenicity (EPA): Classification D - not classified as to human carcinogenicity.

MCL (Drinking Water): 0.05 ppm (Secondary contaminant non-mandatory water quality standard)

OSHA Standards: 5 mg/m<sup>3</sup>, ceiling

NIOSH Standards: 1 mg/m<sup>3</sup> averaged over a 10-hour workshift and 3 mg/m<sup>3</sup>, not to be exceeded during any 15 minute work period.

IDLH: 500 mg/m<sup>3</sup>

ACGIH: 0.2 mg/m<sup>3</sup> averaged over an 8-hour workshift.

### References and Sources

Agency for Toxic Substances and Disease Registry, *Toxicology Profile for Manganese*, Department of Health and Human Services, 2000, Atlanta, GA.

*Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc.*

Panel on Micronutrients, Subcommittees on Upper Reference Levels of Nutrients and of Interpretation and Use of Dietary Reference Intakes, and the Standing Committee on the Scientific Evaluation of Dietary Reference Intakes, Institute of Medicine. National Academy Press, Washington, DC. 2000.