



## Manganese in Water

### Answers to Frequently Asked Questions

#### What is manganese?

Manganese (man'guh-nee-z), abbreviated Mn, is a mineral found naturally in rocks and soil.

Manganese is used to make steel, fireworks, batteries, fertilizer, paint, cosmetics and a gasoline additive. Making and using products like these can release more manganese into the environment through the air, water, and soil. All living things, like plants and animals, naturally contain small amounts of manganese.

Manganese is an essential (needed) mineral. Our bodies use manganese for healthy metabolism, strong bones, and wound healing. Most people get all the manganese they need from their diet. Foods like beans, nuts, and grains can be rich in manganese.

Eating a normal amount of manganese in your diet is healthy and should not cause any problems. In most situations, there is no need to reduce the amount of manganese in your diet.

#### Does Ohio's water contain manganese?

Although tap water from a public water system and bottled water are commonly treated to remove manganese and are usually safe, well water can contain high enough levels of manganese to be a health risk.

There are naturally-occurring minerals in groundwater (underground sources of drinking water) across Ohio. Different geologies (combinations of soils and rocks) across the state contain different levels of minerals. Higher levels of manganese can be found naturally in sandstone which contains groundwater in northeastern Ohio, and in the deeper layers of sand and gravel aquifers under most of the major rivers in the state.

#### Can manganese make me sick?

Although manganese is an essential mineral, you can get sick from exposure to high levels. This can happen if you eat, drink, or breathe too much manganese.

Whether or not you will get sick depends on:

- How much you were exposed to (dose).
- How long you were exposed (duration).
- How often you were exposed (frequency).
- Your general health, age, and lifestyle. Young children, the elderly, and people with chronic (on-going) health problems are more at risk.

High levels of manganese in Ohio's groundwater supply can be a health risk even though the manganese is naturally-occurring due to the minerals in the soil.

#### What health problems can manganese cause?

People who are exposed to amounts of manganese between 1,800 and 14,000 parts per billion (ppb) for a long time are at risk for permanent central nervous system (brain and spinal cord) damage. This is called manganism (man-guh-niz'um). Signs of manganism are similar to those seen with Parkinson's Disease, and can include:

- Feeling weak, clumsy, or slow when you move
- Speaking slowly or taking long pauses when you talk
- Having mood changes, like feeling irritable (angry), feeling nervous, or losing your sex drive
- Other problems like weight loss and muscle pain

Studies have linked health effects such as lowered intelligence quotient (IQ), poor motor functions, decreased attention span and hyperactivity in children exposed to manganese in drinking water at levels greater than 100 parts per billion.

Younger children, including infants less than 1 year old drinking formula mixed with water, appear to absorb more manganese due to increased intake of fluids compared to body weight, and to eliminate less of it through normal bodily functions. Caregivers may wish to consider the use of alternative sources of water for infants and young children where manganese is present at these levels in drinking water sources.

### Does manganese cause cancer?

The U.S. Environmental Protection Agency (EPA) does not have enough scientific proof to know whether high levels of manganese can cause cancer.

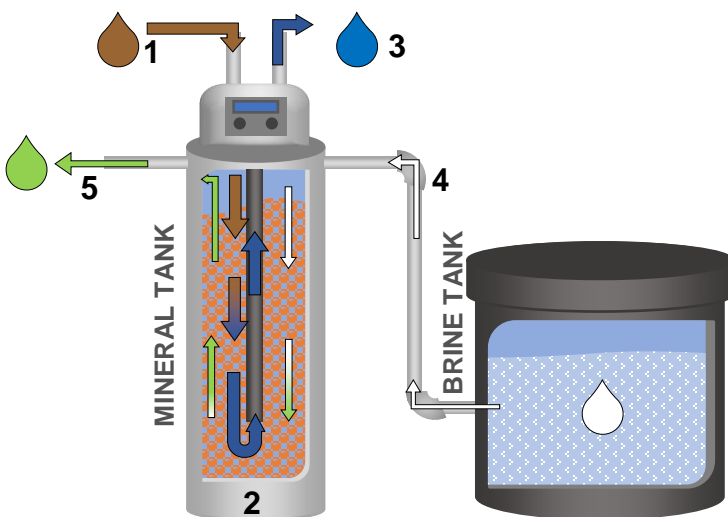
### Can a medical test show if I have been exposed to manganese?

There are different tests to show levels of manganese in a person's body. Fluids like blood, urine, and feces can be used to measure for high levels of manganese. Scalp hair can also be used.

Keep in mind that these tests may show the amount of manganese in your body, but they cannot tell you whether you will have health problems. These tests also cannot tell you where the manganese came from, or tell you about past levels in your body.

### How can I reduce manganese in my well water?

The most effective way to remove manganese and other metals found in your private drinking water is to use a device known as a cation (kat-eye-on) exchange water softener system. These systems are often installed to also remove iron. The diagram below explains the system:



1. Hard water containing manganese and other metals (brown) flows in from the water source.
2. Hard water passes through the mineral tank, which contains resin beads. The beads pull the metal out of hard water to make it soft (brown-to-blue).
3. Soft water (blue) flows out of the mineral tank to your home to be used.
4. Now that the resin is dirty with metals, brine (salt water, white) flows from the brine tank into the mineral tank to clean the resin beads (white-to-green).
5. Dirty brine that contains the metals washed from the resin beads (green) is drained from the system



Water that contains a high level of manganese can be discolored or smell and taste bad. (Image source: Getty Images)

### How does the federal government protect my health from manganese?

Federal and state government develops regulations and health advisories to protect the public from the harmful effects of manganese in water. Different agencies set guidelines for:

- **Drinking Water.** For public water systems, the U.S. EPA has developed different levels of health advisories based on the how long someone is exposed and their age and weight.
  - For 1 to 10 days of exposure to a child, the health advisory limit is 1 part per million of manganese (or 1 milligram per liter).
  - For a lifetime of exposure to an adult, the health advisory limit is 0.3 parts per million (or 0.3 milligrams per liter)

For private water system wells, the Ohio Department of Health has adopted the Federal Drinking Water Health Advisory Levels for manganese as recommended levels for treatment and for provision of information to well users on health effects of consumption.

- **Bottled Water.** U.S. Food and Drug Administration (FDA) has established a standard of 0.05 parts per million of manganese (0.05 ppm, or 0.05 mg/L).

## **References**

Agency for Toxic Substances and Disease Registry (ATSDR). 2012. Toxicological profile for manganese. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Ground Water and Drinking Water. 2009. National primary drinking water regulations. U.S. Environmental Protection Agency.

Minnesota Groundwater Association. 2015. Manganese in Minnesota's groundwaters: Emphasizing the health risks of manganese in drinking water. 36 p.

## **Where can I get more information?**

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246 N. High Street  
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