

Frequently Asked Questions about Manganese in Drinking Water April 2022

What is manganese and where does it come from?

Manganese is a common, naturally-occurring element found in rocks, soil, water, air, and the food we eat. Manganese is an essential nutrient.

How are people exposed to manganese?

The majority of manganese exposure in the general population comes from food. Grains, beans, nuts, seeds, leafy vegetables, and teas are rich in manganese. Manganese is also found in breastmilk and infant formula. Although the primary source of exposure to manganese is food, drinking water can increase the overall dietary intake of manganese.

What are EPA's Health Advisory Levels for Manganese?

Health advisories levels (HALs) are concentrations in drinking water at or below which health effects are not anticipated to occur over a specific duration (for example, one day, ten days, or a lifetime). For manganese, drinking water concentrations above the lifetime HAL are not necessarily harmful to a majority of the population. An individual's nutritional requirements for manganese and potential for harmful health effects may be highly variable. In fact, some adults consume more than 10 mg/day of manganese in their diet without experiencing any harmful health effects. *However, bottle-fed infants who drink water containing more than 0.3 mg/L of manganese over a period of 10 days may have negative neurological effects.* People who have decreased ability to excrete manganese, such as those with liver disease, and the elderly are more prone to the negative effects of elevated manganese exposure than the general population.

EPA's Drinking Water Health Advisory Levels

For bottle-fed infants younger than six months, EPA's 10-day HAL is 0.3 mg/L (or 300 µg/L). This level is also the Lifetime HAL for all persons.

For all persons, EPA's One-day and 10-day HAL is 1 mg/L (or 1000 µg/L).

The Oregon Health Authority – Drinking Water Services expects public water systems to follow these advisory levels and notify their customers if an advisory level is exceeded.

Is manganese regulated in drinking water?

No. There is no national drinking water regulation (NPDWR) for manganese. The Safe Drinking Water Act (SDWA) requires the EPA to evaluate unregulated drinking water contaminants. EPA included manganese on the fourth Contaminant Candidate List after considering new health effects information. The Agency is now gathering occurrence data for manganese in public drinking water systems as part of the fourth Unregulated Contaminant Monitoring Rule (UCMR 4). The next step of the SDWA process will be for the Agency to consider this occurrence information and available health effects information to evaluate whether EPA should develop a NPDWR for manganese.

Why are some drinking water systems testing for manganese?

The EPA's Unregulated Contaminant Monitoring Rule (UCMR 4) requires all large drinking water systems and a subset of small systems to collect samples and report analytical results for manganese and 29 other chemicals. The purpose of this monitoring is to determine if establishing an enforceable national primary drinking water standard for these unregulated contaminants is warranted. Independent of UCMR, some water systems conduct voluntary monitoring for manganese and other unregulated contaminants.

Why does the EPA have a “secondary standard” for manganese in drinking water?

Manganese is among 15 contaminants for which the EPA has established National Secondary Drinking Water Regulations (“secondary standards”) that set non-mandatory water quality standards. They are intended as guidelines to assist public water systems in managing their drinking water for aesthetic considerations. The EPA's secondary-standard concentration for manganese is 0.05 mg/L (or 50 µg/L) and addresses potential staining of plumbing fixtures and laundry, taste, and color effects that may occur above that concentration.

How can I find out if there are elevated levels of manganese in my public drinking water supply?

Customers that are served by a public water system can contact their local water supplier and ask for information on manganese in their drinking water. Customers are encouraged to request a copy of their Annual Water Quality Report (also known as a Consumer Confidence Report). This report lists the levels of contaminants that have been detected in the water during the prior calendar year and identifies whether the system meets state and EPA drinking water standards.

The most recent Consumer Confidence Report can be obtained from your drinking water utility, by visiting their website or contacting them for a copy. Some public water systems upload their Consumer Confidence Report to EPA's website at www.epa.gov/ccr.

Also, if your public water system is collecting occurrence data for UCMR 4 and has submitted results to the EPA, those results may be found in the National Contaminant Occurrence Database (NCOD) <https://www.epa.gov/dwucmr/occurrence-data-unregulated-contaminant-monitoring-rule>.

I live in a community with elevated manganese levels. Who do I call to get more information about what my water system/supplier is doing to address the elevated levels?

Contact your local water supplier to find out more about manganese in your drinking water. If you don't know who your local water supplier is, the information should be included in your latest water bill.

Should I use this water to make formula for my baby?

For drinking water concentrations of manganese above 0.3 mg/L, do not use your tap water to prepare bottles or food for infants under 6 months.

Can I cook with the water?

For drinking water concentrations of manganese above 0.3 mg/L, infants, the elderly, and those with liver disease should avoid eating foods made with tap water such as soup. The tap water may be used to prepare foods, such as pasta, where the water is discarded prior to consumption.

Can I boil the water to remove manganese?

For drinking water concentrations of manganese above 0.3 mg/L, no, do not boil water that you intend to drink. Boiling will concentrate the levels of manganese.

Can I use the water to make ice and drinks?

For drinking water concentrations of manganese above 0.3 mg/L, infants, the elderly, and those with liver disease should avoid consuming the water. Do not use your tap water to prepare bottles or food for infants under 6 months.

Can healthy people 6 months and older consume the water?

Manganese concentrations above 0.3 mg/L (or 300 µg/L) in drinking water are not necessarily harmful to most of the population in the short-term. In fact, some adults consume more than 10 mg/day of manganese in their diet without experiencing any harmful health effects. An individual's nutritional requirements for manganese and potential for harmful effects may be highly variable. However consuming water with manganese concentrations above 0.3 mg/L for long periods, such as a year or more, could put some healthy people over 6 months of age at increased risk of developing neurological health effects. If manganese levels are not expected to be reduced below 0.3 mg/L within a year, everyone with access to that water should find an alternate source of drinking water in the long-term.

If manganese concentrations are greater than 1 mg/L, older infants up to 1-year old should avoid consuming the water. Healthy people older than 1 year old can safely drink the water in the short-term. In the long-term, however, manganese levels should either be brought below 0.3 mg/L, or an alternate source of drinking water should be used.

If you have specific health concerns, you should speak with your health care provider.

Can I use the water to wash dishes and do laundry?

Yes, there are no health concerns associated with these activities. However, at concentrations above 0.05 mg/L, manganese can stain plumbing fixtures and laundry.

Can I bathe, shower, or wash my hands with the water?

Yes. Manganese does not easily absorb through the skin.

Can I brush my teeth with the water?

Yes, water with elevated manganese can be used to brush your teeth.

Can I give the water to my pets and livestock?

Information is not available on the effect of elevated manganese in drinking water on pets and livestock. Please contact your veterinarian.

If I have concerns about my child's health or my own, who should I contact?

If you have health concerns, you should speak to your health care provider about the manganese levels in your drinking water.

If the manganese in my drinking water is currently elevated, should I expect it to return to "normal" levels quickly?

Generally speaking, the concentration of manganese and other naturally-occurring elements does not change significantly over short periods. This is particularly true if your water system relies on groundwater as its source. Centralized- (at the public water system) or in-home treatment may be necessary to reduce high concentrations of manganese.

Does manganese cause "hard" water?

No. Water hardness is a measure of how much magnesium and calcium is dissolved in water. Hard water does not readily rinse away soap and can leave deposits on glasses and plumbing. Water softeners are often used to reduce hardness by removing dissolved calcium and magnesium. Water softeners have also been shown to be effective at lowering manganese levels in tap water, depending on the form of manganese in the water (dissolved or particulate) and concentration.

How does a utility reduce or remove manganese from water?

Manganese levels in drinking water may be controlled through source water management prior to water treatment and distribution. For example, a groundwater system may pump water from alternate wells, or a surface water system may use a multi-level intake to utilize source water with lower background manganese concentrations.

If source water management does not result in a desired reduction in manganese concentration, multiple treatment options are available. Prior to selecting a

treatment option, monitoring should be conducted to characterize the concentration and form of manganese (e.g., dissolved, particulate, colloidal) in the source water, so that the most viable treatment option is determined. Chemical oxidation followed by precipitate removal, sorption and catalytic oxidation, ion exchange, and lime softening have been shown to be effective at reducing manganese levels in finished water.

I get my tap water from a private well. How can I find out if manganese is in my water?

If you are concerned about the possibility of manganese in your drinking water and you are served by a private well, EPA recommends having your drinking water tested for manganese. Laboratory analysis is necessary to determine if your water contains manganese. Qualified testing labs can analyze a sample of your water to determine whether manganese is present and at what concentrations.

Oregon Health Authority – Drinking Water Services recommends you have testing done at an accredited testing lab. Typical cost is less than \$75 per sample. More information about private wells can be found at www.healthoregon.org/wells or www.epa.gov/privatewells.

How does a homeowner remove manganese from water?

Water softeners and reverse osmosis have been shown to be effective at lowering manganese levels in tap water, depending on the form of manganese in your water (dissolved or particulate) and concentration. Boiling water will not remove manganese but will instead concentrate it.

It's important to verify that the filter, purifier or treatment system is certified to the applicable standard for the reduction of the contaminants of most concern. For more information on home filtration treatment system certification, you can go to the following links: <https://www.nsf.org/knowledge-library/standards-water-treatment-systems> or www.wqa.org/find-products#/. Filters found in refrigerators, water pitchers, or filters installed on your water tap are not effective at removing manganese and one should check with the filter manufacturer for specific detail. Also, keep in mind that any type of treatment device requires regular maintenance, such as changing filters, cleaning scale build-up, maintaining adequate salt levels in brine tanks, or disinfecting the unit. Follow the manufacturer's recommendations for filter replacements and maintenance.

Failure to properly maintain a unit reduces its effectiveness and, in some cases, may make the water quality worse. Continued maintenance is necessary for the life of the device along with regular water testing to ensure the device is working properly. Ensuring your system is working properly may minimize the need for testing.

For more information:

- EPA's Office of Ground water and Drinking Water:
www.epa.gov/ground-water-and-drinking-water
- EPA's Drinking Water Health Advisory for Manganese:
www.epa.gov/sites/production/files/2014-09/documents/support_cc1_magnese_dwreport_0.pdf
- EPA's Secondary Drinking Water Standards:
www.epa.gov/dwstandardsregulations/secondary-drinking-water-standards-guidance-nuisance-chemicals