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## Manganese in Drinking Water: Typical Questions and Answers for Consumers

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### **Introduction**

This fact sheet is intended to inform you about the nature of manganese in drinking water, typical concentrations, its contribution to overall manganese exposure in humans, especially infants and children, and provide guidance on health protection limits in drinking water.

### **What is manganese and where does it come from?**

Manganese is a common naturally-occurring mineral found in rocks, soil, groundwater, and surface water. Manganese is a natural component of most foods and it is an **essential** trace mineral in our diets.

### **How are people exposed to manganese?**

Manganese is a natural component of most foods, including infant formula. The majority of manganese exposure in the general population comes from the diet. The USDA's recommended dietary allowance is 1.8 - 2.3 mg/day for adults. Grains and beans particularly provide manganese in our diets. For example, a cup of cooked enriched white rice contains 0.75 mg of manganese.

The principal source of exposure to manganese is from food, but in situations where manganese levels in drinking water are elevated, the contribution from drinking water can increase the overall intake of manganese.

In a residential setting, inhalation is an unlikely route of concern for exposure, in contrast to certain occupational settings where workers may be exposed to manganese particles in the air (*e.g.*, steel welding). Manganese is poorly absorbed through the skin, thus, skin contact with food or liquid containing manganese is an unlikely exposure route of concern.

### **What health effects are associated with exposure to manganese?**

Manganese is necessary for normal immune system function, digestion and bone strength. Some studies suggest that early childhood exposures to elevated levels of manganese in drinking water can have adverse effects on learning and behavior. In addition, young children appear to absorb more manganese than older age children but excrete less.

Infant formulas contain manganese, and if prepared with water that also contains manganese, the infant may get a higher dose than the rest of the family. This adds up to a greater potential for exposure in the very young. Thus, it is very important to know what the levels in drinking water are when using it to make baby formula.

As a precaution, older children and adults should also limit their consumption of drinking water with high levels of manganese due to possible neurological effects.

### **What are the levels of concern?**

The United States Environmental Protection Agency (USEPA) and MassDEP currently list manganese as a secondary contaminant because of aesthetic concerns including unacceptable taste, staining of fixtures and dark, cloudy water at levels greater than 50 micrograms per liter (ug/L).

Over a lifetime, the USEPA and MassDEP recommend that people drink water with manganese levels less than 300 micrograms per liter (ug/L) and over the short term, recommend that people limit their consumption of water with levels over 1000 ug/L, primarily due to concerns about possible neurological effects. Children up to 1 year of age should not be given water with manganese over 300 ug/L, nor should formula for infants be made

with that water for longer than 10 days. See EPA Drinking Water Health Advisory for Manganese at: [http://www.epa.gov/safewater/ccl/pdfs/reg\\_determine1/support\\_cc1\\_magnese\\_dwreport.pdf](http://www.epa.gov/safewater/ccl/pdfs/reg_determine1/support_cc1_magnese_dwreport.pdf)

***How much manganese is there in drinking water?***

Water that is used as a source of drinking water invariably has some manganese in it. In addition, minerals such as manganese can settle out and build up fine sediment in water pipes as water flows through the distribution system of water mains to your tap. When there is a disturbance in the system, such as a water main break, use of fire hydrants, or a flushing operation to clean the pipes, sediment may get stirred up and drawn into home plumbing. This water may have higher than normal levels of manganese and may appear visibly discolored.

Manganese has been detected at elevated levels in a few drinking water sources in the Commonwealth and MassDEP is continuing to collect additional data to determine manganese levels for all public drinking water systems. This will be an on-going effort. Community public water systems that have detected manganese over the EPA Health Advisory have informed their customers in their systems annual Consumer Confidence Report (CCR). Non-community systems that have detected manganese over the EPA Health Advisory have posted notice for their customers.

***How can I find out about manganese in my water?***

If you get your water from a public water system you should contact your public water system. For a contact list for all public water systems in the Commonwealth you may visit <http://www.mass.gov/eea/agencies/massdep/water/drinking/health-and-safety.html#3> then under Contacts click on MA Public Water Supplier Contacts Sorted By Towns.

For private well owners, MassDEP recommends that a baseline sample be done to determine the concentration in their well water. Thereafter, the well owner should follow the: "Private Wells - Testing Parameters and Frequency Guidelines", which can be found on the MassDEP website <http://www.mass.gov/eea/agencies/massdep/water/drinking/private-wells.html> then click on Private well – Testing parameters and frequency Guidance

***What options are available when manganese in drinking water is elevated?***

You may use:

- ✓ Bottled water. If you choose to use bottled water check the Mass Department of Public Health (MDPH) web page to locate bottled water that is free of manganese.
- ✓ Water from another MassDEP approved public water system that does not have elevated levels of manganese.
- ✓ A water pitcher filter or a home water filter unit that is capable of removing dissolved metals. For more information on water pitcher filters and home water filter units please visit National Sanitation Foundation (NSF) at NSF Consumer Information or call 1-800-673-8010.

**Do not boil the water.** Boiling will concentrate the levels of manganese. If infants and children may be exposed to manganese in drinking water greater than 300 ug/L, for example in daycare facilities, schools or other venues, then alternate sources of water, such as bottled water, should be used to reduce the levels of exposure.

***Can I cook with the water?***

No. As a precaution, do not use the water for cooking. Cooking will add manganese to your food.

***Can I brush my teeth with the water?***

Yes. You are unlikely to ingest enough manganese to be of concern.

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

Yes. Manganese is poorly absorbed through the skin.

***Can I use it to wash dishes?***

Yes.

***I have used the water for cooking, making ice and drinks. Should I be concerned? Is this something I should go to the doctor about?***

You should dispose of ice and drinks made with the tap water. If you have concerns, you should speak to your health care professional.

***Can I give the water to my pets?***

As a precaution, you may wish to use bottled water. No information is available on the effect of elevated manganese in drinking water on pets.

Please note: Only a Massachusetts state certified laboratory or another party who complies with Massachusetts General Law Chapter 111, Section 160D should test your water for manganese.

<http://www.mass.gov/eea/docs/dep/water/drinking/alpha/i-thru-z/reqdiscl.doc>

***Where can I get more information on manganese?***

For more information on manganese in public drinking water please visit the MassDEP webpage at <http://www.mass.gov/eea/agencies/massdep/water/drinking/manganese-in-drinking-water.html>. You may also contact the MassDEP Drinking Water Program at [program.director-dwp@state.ma.us](mailto:program.director-dwp@state.ma.us).

For questions related to manganese exposure and health you may contact MassDEP's Office of Research and Standards ([Michael.Hutcheson@state.ma.us](mailto:Michael.Hutcheson@state.ma.us)). You may also contact your Local Board of Health and/or your healthcare provider.