



Manganese in Drinking Water

Manganese occurs naturally in several forms in the environment and is widely distributed in air, water and soil. Manganese is generally more prevalent in groundwater than in surface waters, and is often found with high levels of iron. Manganese is used in various industries, including in the steel industry, in the manufacture of various products (e.g., fireworks, dry-cell batteries, fertilizers, fungicides and cosmetics and paints). In its permanganate form, it is also used as an oxidizing agent in the treatment of drinking water.

People may be exposed to manganese through its presence in ambient air, food, consumer products, soil and drinking water. Food is the main source of manganese exposure; however, manganese is more readily absorbed from drinking water than from food. Intake of manganese from drinking water is not expected through either skin contact or inhalation.

How does manganese get into my water?

Manganese may be present in water in the environment from natural sources (rock and soil weathering) or as a result of human activities (such as mining, industrial discharges and landfill leaching). Levels of manganese in fresh water in Canada are usually below 0.12 mg/L. Higher levels can occur in acidic groundwater and with industrial discharges.

How can manganese affect my health?

Manganese is a nutrient people need at low levels in their diet. Being exposed to high levels can lead to potential health effects on the central nervous system.

Manganese is readily taken up by the central nervous system, and can be found in other tissues including the lungs, kidneys. Research suggests an association between exposure to high levels of manganese in drinking water and neuropsychological issues in infants and children, such as changes in behavior, lower IQ, speech and memory difficulties, lack of coordination and movement control.

There has been no evidence suggesting manganese causes cancer.

What are the Guideline limits for manganese in drinking water?

The *Guidelines for Canadian Drinking Water Quality* established by Health Canada has set the maximum acceptable concentration (MAC) at 0.12 milligrams per litre (mg/L) and an aesthetic objective (AO) of 0.02 milligrams per litre (mg/L) for manganese in drinking water. The MAC is established at a level to be protective of health effects in infants, the most sensitive population, and the AO will minimize the occurrence of discoloured water and improves consumer confidence in drinking water quality.

How do I know if there is manganese in my drinking water?

The presence of manganese in drinking water can cause unpleasant taste or odour, discoloration or black precipitate, dark slime formation on water fixtures (due to bacterial growth), and dark staining of laundry. Private water supplies can be tested by an accredited laboratory to determine

manganese levels, as well as the presence of other chemical parameters that can affect manganese removal. All public water supplies are regularly tested for manganese.

What there are high levels of manganese in my drinking water?

Boiling water with elevated manganese levels will not make the water safe. An alternate safe water source, or water treated with an appropriate treatment device must be used for drinking, cooking, making juice, drinks, ice or infant formula, brushing teeth or soaking dentures, washing fruits and vegetables, and making soup, tea or coffee. Water with elevated manganese levels may still be used for handwashing, washing dishes, bathing, and laundry.

If high concentrations of manganese are found in your drinking water:

- Look for an alternate water source with low manganese concentrations. Where possible, connect to a public water distribution system.
- Install a point of use water treatment device that can reduce the level of manganese at the tap. Look for treatment devices that have been certified by an accredited certification organization as meeting the appropriate NSF International (NSF)/American National Standards Institute (ANSI) drinking water treatment unit standards. Although there are currently no devices certified to remove manganese, reverse osmosis (RO) devices that have been certified NSF/ANSI standard 58 to remove other metals (such as arsenic or lead) are effective for manganese control.
- Install a point of use entry treatment device that can reduce the level of manganese throughout the home. These devices would include water softeners and manganese greensand filters.

Selection of the most effective treatment system for a household will depend on a variety of factors, including the concentration and form (dissolved or particulate) of manganese and other parameters such as hardness, iron, alkalinity, sulphide, ammonia and dissolved organic carbon that are present in the source water. After the chosen system is installed, have the treated water tested for manganese at a private accredited lab to make sure your system is working properly. Monitor and maintain your water treatment equipment according to manufacturer instructions.

If you are concerned about health risks from the consumption of water containing manganese, please contact your doctor.

For more information about manganese in drinking water, contact your local Environmental Health Officer.

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