



MOLYBDENUM IN DRINKING WATER

Molybdenum is a naturally occurring metal found in small amounts in soil and rock. It can also be found in groundwater, either naturally occurring or as the result of industrial activities. Some molybdenum is necessary in a healthy diet, but too much can cause problems. If you have molybdenum in your drinking water, this fact sheet can help you decide whether you need to seek an alternative supply of drinking water.

How do I know if I have molybdenum in my drinking water?

The only way to know if you have molybdenum in your water is to have your water tested by a state-certified laboratory. Find a certified laboratory by searching the telephone directory under "Laboratories-Testing." The Department of Natural Resources (DNR) maintains a list of labs certified to test for molybdenum: http://dnr.wi.gov/regulations/labCert/documents/LabLists/WI_Mo_Labs.pdf.

How much molybdenum is usually found in well water?

A study of over 2,700 wells in the northern half of Wisconsin found detectable levels of molybdenum in approximately 20% of the wells. In 98% of the study samples, molybdenum levels were lower than 20 micrograms per liter ($\mu\text{g/L}$).

A recent DNR study in southeastern Wisconsin found that some wells in that area have elevated molybdenum levels. The source of this molybdenum is not known. The Department of Health Services (DHS) and DNR recommend that private well owners living in or near the molybdenum testing area (Franklin and Oak Creek in Milwaukee County; Caledonia, Norway and Raymond in Racine County; and Muskego in Waukesha County), or near locations of elevated molybdenum results, add molybdenum testing to their annual private well-testing for bacteria and nitrates. A list of recommended parameters for private well sampling can be found at: <http://dnr.wi.gov/regulations/labcert/documents/testsforwell.pdf>.

How much molybdenum is healthy, and how much is too much?

Molybdenum is an essential nutrient in human diets. Molybdenum is found in small amounts in leafy vegetables, legumes, grains, organ meats, and sunflower seeds. The typical US diet provides around 100 micrograms per day ($\mu\text{g/day}$) of molybdenum from food.

The Institute of Medicine's Food and Nutrition Board has recommended daily levels, as well as Tolerable Upper Intake Levels for molybdenum consumption for children and adults. The table on the next page shows the combined daily intake (food and water) range of these recommendations for children and adults.

Molybdenum is not regulated in public drinking water supplies. However, the DNR does have a groundwater quality enforcement standard for molybdenum of 40 $\mu\text{g/L}$, based on the US Environmental Protection Agency's (EPA) Lifetime Health Advisory (LHA). The EPA is currently reviewing their LHA level for molybdenum in drinking water. In 2013, the Wisconsin Department of Health Services (DHS) conducted a review of the scientific literature on molybdenum and determined that for individual well owners their health will not be affected by drinking water with molybdenum at levels up to 90 $\mu\text{g/L}$. Until the EPA completes its LHA review, the state will use an interim health advisory level for molybdenum of 90 $\mu\text{g/L}$ for individual drinking water advisories. For more information regarding the health advisories, see the DNR webpage at: <http://dnr.wi.gov/topic/Groundwater/molybdenum.html>.

Molybdenum levels below 90 µg/L in well water are not an individual health concern. If your water tests higher than the health advisory level, DHS recommends that you not use your water for drinking or in foods where water is a main ingredient, (like soup, coffee, tea, Jell-O, etc.) and that you find a different source of safe water to drink. Your water is still safe to use for washing fruits and vegetables, hand washing and other household uses (flushing toilets, bathing, washing dishes and laundry).

Drinking two liters of water a day (the typical amount consumed by adults) that contains molybdenum at 90 µg/L would contribute an additional 180 µg/day of molybdenum to your diet.

Table 1. Recommended Dietary Levels and Tolerable Upper Intake Levels (for Molybdenum, Food and Nutrition Board, Institute of Medicine (2001))

Age	Recommended Dietary Allowance for Molybdenum (in micrograms/day)	Estimated Tolerable Upper Intake Level for Molybdenum (micrograms/day)
Infants up to 6 months	2 µg/day	<i>not determinable</i>
Infants 7 to 12 months	3 µg/day	<i>not determinable</i>
1 to 3 years	17 µg/day	300 µg/day
4 to 8 years	22 µg/day	600 µg/day
9 to 13 years	34 µg/day	1,100 µg/day
Youth (14-18 years)	43 µg/day	1,700 µg/day
Adult (18+ years)	45 µg/day	2,000 µg/day

What health effects can be caused by too much molybdenum?

In animal studies, exposure to high levels of molybdenum was associated with effects on the reproductive system. Information on reproductive effects of molybdenum in humans is very limited. It is unclear whether exposure to molybdenum can result in reproductive effects in humans.

For infants under the age of one, more study is needed to understand the effects of molybdenum exposure. There is concern that infants may be more sensitive and less able to handle excess amounts of molybdenum. This is one reason why the groundwater enforcement standard is lower than the tolerable intake level.

This fact sheet summarizes information about this element and is not a complete listing of all possible effects. It does not refer to other routes of exposure such as airborne dust exposure, work exposure or emergency situations.

Where can I get more information?

Contact the Wisconsin Department of Health Services (DHS) at the address and phone number below or your local health department for more information regarding molybdenum in well water.

- Wisconsin DHS, Division of Public Health, 1 W Wilson St, Rm. 150, Madison, WI 53701-2659, (608) 266-1120 or visit the DHS website: <http://dhs.wisconsin.gov/eh>
- Wisconsin Local and Tribal Health Department Listing: <http://dhs.wisconsin.gov/localhealth>
- Wisconsin Department of Natural Resources, Bureau of Drinking Water and Groundwater (608) 266-0821, DNR website on molybdenum: <http://dnr.wi.gov/topic/Groundwater/molybdenum.html> (exit DHS)