Copper in Drinking Water

Copper is a metal and an essential nutrient found naturally in the environment. It can be present in:

- air
- soil
- food
- water
- certain products (for example: nutritional supplements, plumbing products)

In Canada, copper is not usually found in natural sources of water or in water from drinking water treatment plants. Copper can enter drinking water if it is released from parts of distribution or plumbing systems. Copper is more likely to be present in the drinking water of homes and neighbourhoods that have copper pipes.

Copper from plumbing parts

The most significant source of copper in drinking water is likely to be from copper pipes. Copper is commonly used in home plumbing to supply the water to and throughout your home because it is an acceptable material for use under the National Plumbing Code of Canada. Some plumbing parts or fittings, such as faucets or valves, may also contain copper that can leach (seep) into drinking water.

Many things can affect the amount of copper that seeps into drinking water, including:

- chemistry of the water
- age of the plumbing system
- length of time the water sits in the pipes

Copper pipes have an orange colour to them but older copper can appear dark brown or green. You may be able to see copper pipes in your basement and you can look at the water service line entering your home (you may be able to see a portion of the service line in the basement, by the water meter) to see if it’s made of copper.

Generally, in Canada, copper levels at the tap are low. Testing conducted by your municipality or by an accredited laboratory can determine if copper is present in the water. These testing results as well as an understanding of the water treatment and the flow of water in the pipes can determine if the water is safe for consumption. Monitoring results from your municipality or by an accredited laboratory can be utilized to determine if copper levels are below Health Canada’s maximum acceptable concentration. The municipality must continue to monitor the copper levels to ensure that this remains unchanged.

Health Effects of Copper in Drinking Water

Although you need small amounts of copper to be healthy, too much copper in drinking water can lead to some negative health effects.

Short term exposure to high levels of copper in drinking water may cause:

- nausea
- stomach pain
- vomiting
- diarrhea

Long term exposure to high levels of copper in drinking water may cause effects on:

- liver
- kidney

In addition, infants may be more at risk than older children and adults because they:

- absorb more copper
- drink more water based on body weight when compared to adults
- are less able to remove copper from their bodies because their organs are still growing

Guideline Value for Copper in Drinking Water in Canada

Based on recent scientific studies on copper showing negative health effects related to exposure to high levels of copper in drinking water, Health Canada worked with the provinces, territories and other federal departments to establish a new guideline value for copper in drinking water of 2 milligrams per litre (mg/L). The guideline value is protective of the health of Canadians, including the most vulnerable members of society, such as infants and children. It is also protective of both short term and long term exposures.

Copper also poses an aesthetic concern in drinking water, causing blue/green staining of laundry and plumbing fixtures as well as causing a metallic, bitter taste. Health Canada has established an aesthetic objective of 1 mg/L for copper in drinking water to minimize the occurrence of staining and taste complaints and to improve consumer confidence in drinking water quality.

The Guideline for Canadian Drinking Water Quality for Copper sets out the basic parameters that every water authority should strive to achieve in order to provide the cleanest, safest and most reliable drinking water possible.

How to Reduce your Exposure to Copper in Drinking Water

If you have high levels of copper in your drinking water, there are effective ways to remove it, as described in the next section. In the meantime, you can reduce your exposure to copper using a few simple, temporary measures:

- use only cold tap water, hot water increases the release of copper and other metals from your plumbing, (let it run for about 1 minute) for:
    - drinking
    - cooking
    - preparing infant formula
- flush out your plumbing after water has been sitting in the pipes for a few hours, such as first thing in the morning or when you get home from work. Clear the pipes by:
    - flushing the toilet

- taking a shower
- starting a load of laundry

Copper will not enter your body through skin or by breathing in vapours while showering or bathing. Bathing and showering in water that contains copper should not be a health risk.

If you are pregnant, breastfeeding or caring for an infant

If you are pregnant, breastfeeding or preparing infant formula and suspect that your drinking water may contain copper, you should have it tested. If copper levels are above the guideline value, you should:

- use an alternate source of drinking water
- install a treatment device to remove copper

Removing Copper from Drinking Water

The options for removing copper from drinking water include water treatment devices or upgrading your plumbing materials.

Using water treatment devices

There are effective household water treatment devices that are certified to remove copper from drinking water at the tap. These include:

- carbon-based filters
- reverse osmosis or distillation treatment devices

For best results, a device should be installed at the tap that is most commonly used for drinking water. In most cases, this is the kitchen tap.

Make sure that any device you use is:

- certified as meeting the NSF/ANSI standard for copper removal (look at the box or label)
- installed and maintained according to the instructions given by the manufacturer

Treatment devices are currently certified to remove copper down to 1.3 mg/L, well below the health guideline. If you also have aesthetic concerns from copper in drinking water, these treatment devices may be able to reduce the copper to levels that don’t cause staining or a bitter taste. If you have questions about the device, you can contact the manufacturer.

It is important to make sure treatment devices are maintained (or replaced) according to the instructions provided by the manufacturer. Since water treatment devices require ongoing maintenance, such as the regular replacement of filters, they are not considered permanent solutions.

Upgrading the plumbing material

Upgrading your plumbing material is a permanent solution to ensure your plumbing parts are copper-free. You, or your plumber, can remove any pipes, fittings or faucets in your home that contain copper. However, this may not be practical or cost effective in some cases.

Values in Other Countries

Health Canada has established a health-based value for copper in drinking water of 2 mg/L and an aesthetic objective of 1 mg/L. These values are comparable to limits established by other countries and organizations.

Some examples of health-based values in other jurisdictions include:

- European Union: value limit of 2 mg/L
- Australia: guideline value of 2 mg/L
- United States: maximum contaminant level of 1.3 mg/L which is also the treatment-based action level for copper in drinking water
- World Health Organization: drinking water guideline value of 2 mg/L

The United States and Australia both have an aesthetic objective of 1 mg/L for copper in drinking water.