

# Water Mineral Analysis

The Canadian Water Quality Guidelines for chemical and physical parameters of water are:

- Health based and listed as maximum acceptable concentrations (MAC);
- Based on aesthetic considerations and listed as aesthetic objectives (AO); or
- Established based on operational considerations and listed as operational guidance values (OG).

Parameter	Guidelines for Canadian drinking water quality	Comments
<b>Alkalinity (as CaCO<sub>3</sub>)</b>	No numerical guideline	Alkalinity measures the concentrations of bicarbonate, carbonate, and hydroxide ions that are naturally present in water and is expressed as an equivalent concentration of calcium carbonate (CaCO <sub>3</sub> ). At normal drinking water pH levels, bicarbonate and carbonate are the main contributors to alkalinity.
<b>Aluminum</b>	MAC of 2.9 mg/L OG of 0.100 mg/L	Aluminum may be present in water from natural sources or as a result of human activities. Intake of aluminum from drinking water is not expected to occur through either skin contact or inhalation. Studies in humans have found possible associations between aluminum ingestion and diseases of the nervous system. Since aluminum can act as an accumulation sink for other contaminants, the OG value of 0.100 mg/L applies to their entry points to minimize the potential accumulation and release of aluminum and co-occurring contaminants. Aluminum can also coat watermains, service lines and water meters, resulting in pressure losses, meter malfunctions or turbid/discoloured water.
<b>Arsenic</b>	MAC of 0.01 mg/L	In water, arsenic has no taste, smell, or colour. It can only be detected through a chemical test. Some areas of Nova Scotia have a greater potential for elevated arsenic levels in drinking water. Short-term exposure to high levels of arsenic in drinking water can cause nausea, diarrhea, and muscle pain. Long-term exposure (over years or decades) to low levels of arsenic in drinking water may cause certain types of cancer.
<b>Barium</b>	MAC of 2 mg/L	In water, barium has no taste, smell, or colour. It can only be detected through a chemical test. The amount of barium present in water is usually not high enough to become a health concern. However, there are some areas of Nova Scotia where barium may be elevated. Exposure to high levels of barium in drinking water can cause gastrointestinal discomfort, muscular weakness, high blood pressure, or cardiovascular disease.
<b>Boron</b>	MAC of 5 mg/L	In water, boron has no taste, smell, or colour. It can only be detected through a chemical test. It may be present in groundwater due to industrial effluent, leaching of fertilizer, sewage or leaching of landfill materials. Exposure to very high concentrations in drinking water can cause reproductive malfunction in men and developmental abnormalities.

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<b>Cadmium</b>	MAC of 0.007 mg/L	In water, cadmium has no taste, smell, or colour. It can only be detected through a chemical test. Exposure to high levels in drinking water can cause gastrointestinal discomforts and kidney damage.
<b>Calcium</b>	No numerical guideline	Calcium is present in all natural waters. It is a major contributor to drinking water hardness. Excessively hard water can affect the function and lifetime of plumbing systems and appliances.
<b>Chloride</b>	AO of $\leq 250$ mg/L	Drinking water and drinks prepared with water containing chloride may have a salty taste at concentrations as low as 100 mg/L. Most people find that water with more than 250 mg/L of chloride is unpleasant to drink.
<b>Chromium</b>	MAC of 0.05 mg/L	Chromium may affect the taste or smell of well water, but not at levels normally found in groundwater. The most common source of chromium in ground water is due to the burning of fossil fuel, as well as mining and industrial effluent.
<b>Conductivity</b>	No numerical guideline	Conductivity (conductance) is an indication of dissolved salts in the water and is a measure of the water's ability to carry an electrical current. Conductivity is one of several parameters used to indicate overall water quality.
<b>Copper</b>	MAC of 2.0 mg/L AO of $\leq 1.0$ mg/L	Copper is frequently found naturally in groundwater; however, levels are generally very low. Common synthetic sources of copper are fertilizers, septic systems, animal feedlots, industrial waste, and food processing waste. Some copper occurs naturally, however, much of it may come from the plumbing system due to the corrosive tendencies of water with low pH and low alkalinity.
<b>Hardness</b>	No numerical guideline, but the optimum range in drinking water is between 80 and 100 mg/L	Water is made hard by high levels of calcium and magnesium. Hard water causes scale formation in pipes, on plumbing fixtures, and in heating systems. Hardness is one of several parameters used to indicate overall water quality. Water with hardness greater than 500 mg/L is normally considered unacceptable for domestic purposes.  Quality Classification for Hardness mg/L ( $\text{CaCO}_3$ ) Very Good (Soft) 0–59 Good (Slightly Hard) 60–120 Fair (Hard) 121–180 Poor (Very Hard) >180
<b>Iron</b>	AO of $\leq 0.1$ mg/L	At levels above 0.1 mg/L, iron stains laundry and plumbing fixtures, and causes undesirable tastes. The precipitation of excessive iron imparts an objectionable reddish-brown color to the water. The presence of iron may also promote the growth of certain micro-organisms, leading to the deposition of a slimy coat in piping.

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<b>Lead</b>	MAC of 0.005 mg/L	In water, dissolved lead has no taste, smell, or colour. It can only be detected through a chemical test. The main source of lead in drinking water is through corrosion of plumbing materials with lead or brass components. Exposure to lead in drinking water can cause health effects including damage to the brain and nervous system, kidney dysfunction and reproductive issues.
<b>Magnesium</b>	No numerical guideline	Magnesium in drinking water can have a laxative effect and can also affect the taste of water. High levels of magnesium cause water to be hard.
<b>Manganese</b>	MAC of 0.12 mg/L AO of $\leq 0.02$ mg/L	Manganese occurs naturally in the environment and is widely distributed in air, water and soil. It is objectionable in water supplies as it stains plumbing fixtures and laundry and may lead to the accumulation of microbial growths in the distribution system. Higher concentrations can cause undesirable tastes in beverages. Current evidence indicates that manganese in drinking water above the MAC over a prolonged period of time can adversely affect neurological development in children, and memory, attention and movement in adults.
<b>Nitrate + Nitrite</b>	Nitrate-nitrogen MAC of 10 mg/L Nitrite-nitrogen MAC of 1.0 mg/L	<p>The presence of nitrate may indicate improperly treated sewage or fertilizer, or it may occur naturally. Nitrate contamination is often one of the first signs of deteriorating groundwater quality and could indicate other problems with well water quality.</p> <p>Nitrate-nitrogen levels greater than 10 mg/L and Nitrite-nitrogen levels greater than 1.0 mg/L can pose a risk to infants up to six months old.</p> <p>The laboratory results are expressed as combined Nitrate + Nitrite.</p>
<b>pH</b>	AO of between 7.0 and 10.5	A pH less than 7.0 may contribute to the corrosion of pipes and fittings. A pH less than 7.0 is not a health-risk in itself, but corrosive water can dissolve metals, such as lead, cadmium, zinc, and copper present in pipes. This may lead to increased concentrations of these metals in drinking water, which can cause health concerns. A pH greater than 10.5 may contribute to scale build-up in plumbing materials. pH is one of several parameters used to indicate overall water quality.
<b>Potassium</b>	No numerical guideline	Potassium is naturally occurring, but the most common source of potassium in drinking water are water treatment systems, such as ion exchangers (water softeners) that use potassium chloride.

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<b>Sodium</b>	AO of $\leq 200$ mg/L	All groundwater contains some sodium, because most rocks and soils contain sodium compounds from which sodium is easily dissolved. An increase in sodium in groundwater above natural levels may indicate pollution or saltwater intrusion.  In water, sodium has no smell or colour, but can give water a salty taste. Sodium can be detected through chemical testing.
<b>Sulphate</b>	AO of $\leq 500$ mg/L	Sulphate present above 500 mg/L in water may affect the taste of water. At levels above 1000 mg/L, sulphate in drinking water can have a laxative effect, although these levels are not normally found in drinking water.
<b>Uranium</b>	MAC of 0.02 mg/L	In water, uranium has no taste, smell, or colour. It can only be detected through a chemical test. Exposure to uranium in drinking water can result in kidney damage.
<b>Zinc</b>	AO $\leq 5$ mg/L	Galvanized liners or fittings or metal pipes coated with zinc, present in many older wells or plumbing systems, can leach zinc into drinking water.

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