

The drop on water

# Sulphate

Sulphate ( $\text{SO}_4^{2-}$ ) is a combination of sulphur (S) and oxygen (O). It occurs naturally in many soil and rock formations.

## Sources

In groundwater, most sulphates are generated from the dissolution of minerals, such as gypsum and anhydrite.

Saltwater intrusion and acid rock drainage are also sources of sulphates in drinking water.

Man-made sources include industrial discharge and deposition from burning of fossil fuels.

## Aesthetic Objective for Drinking Water $\leq 500$ mg/L

The Canadian drinking water quality guideline for sulphate is an Aesthetic Objective (AO) of less than or equal to **500 milligrams per litre (mg/L)**.

Sulphate in water may produce a noticeable taste at higher concentrations.

## Health Risks

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.

Sulphate minerals in drinking water can increase corrosion of plumbing and well materials. Sulphur bacteria may produce a dark slime or deposits of metal oxides that develop as a result of the corrosion of metal pipes. The slime or deposits can clog plumbing and stain clothing. See our fact sheet on iron and sulphur bacteria for more information.

## QUICK FACTS

- Sulphate is found naturally in groundwater through the weathering of rocks.
- Human activities can also be sources of sulphate in well water.
- Sulphate may give water a noticeable taste and may cause corrosion of pipes.
- Sulphate can be detected through chemical testing.
- The Canadian drinking water quality guideline for sulphate is an Aesthetic Objective (AO) of less than or equal to **500 mg/L**.
- To improve the aesthetic quality of drinking water, homeowners may consider water treatment options or use an alternative water source.

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## Testing

Regularly test your well water for a standard suite of chemical parameters, including sulphate. Use an accredited water testing laboratory. Find a list of accredited water testing laboratories at [www.gov.ns.ca/nse/water/waterlabs.asp](http://www.gov.ns.ca/nse/water/waterlabs.asp) or see the Yellow Pages under “laboratories.”

Get the special sampling bottles and instructions on proper sampling from the laboratory.

The cost of analyzing water samples can range from \$15 for a single parameter to \$230 for a full suite of chemical parameters. The cost can vary depending on the lab and the number of parameters being tested.

## Solutions

If sulphate is present above 500 mg/L in the first test, get a second test to confirm the original results.

Sulphate is an aesthetic parameter. Aesthetic parameters may impair the taste, smell, or colour of water. Although sulphate does not pose a health risk at levels normally found in drinking water, its presence can indicate deteriorating groundwater quality and could indicate other problems with well water quality, which may cause adverse health effects.

If sulphate is confirmed to be present above 500 mg/L in the well water, investigate the source of sulphate in drinking water. Consider the following:

- If the sulphate is from surface sources, such as industrial discharges, it may indicate the presence of pathogens or other contaminants present in surface water, which may cause adverse health effects:
  - Test your well water for other contaminants, including bacteria.
  - Inspect the well construction.
  - Consider drilling a new well with proper site selection and construction to prevent contamination.
- Use water conservation measures, particularly in coastal areas, especially in summer months when groundwater recharge is lowest, to reduce the risk of saltwater intrusion.

## REGULAR TESTING

Homeowners are responsible for monitoring the quality of their well water:

- Test for bacterial quality every 6 months.
- Test for chemical quality every 2 years.
- Test more often if you notice changes in physical qualities – taste, smell, or colour.

Regular testing alerts you to problems with your drinking water.



When the source of sulphate does not pose a health risk, treating your water is optional. You may choose to treat your water to improve the taste and make it more pleasing to consume.

When the source of sulphate is from surface sources and other contaminants, including bacteria, are present, consider well construction improvements or water treatment options.

### Treatment

Sulphate cannot be removed from water through boiling.

We recommend purchasing a treatment system that has been certified to meet the current NSF standards. NSF International is a not-for-profit, non-governmental organization that sets health and safety standards for manufacturers in 80 countries. See its website at [www.nsf.org](http://www.nsf.org).

Although there are currently no treatment units certified specifically for sulphate reduction, effective treatment methods for reducing sulphate levels in drinking water include

- anion exchange
- distillation
- reverse osmosis

The effectiveness of these methods may depend on

- the volume of water to be treated
- the concentration of sulphate in the water
- the presence of other chemical parameters in the water
- whether bacterial contamination is a concern

Once installed, re-test your water to ensure the treatment system is working properly. Maintain the system according to the manufacturer's instructions to ensure a continued supply of safe drinking water.

For more information on water treatment, see our publications *Water Treatment Options* and *Maintaining Your Water Treatment*, part of the *Your Well Water* booklet series at [www.gov.ns.ca/nse/water/privatewells.asp](http://www.gov.ns.ca/nse/water/privatewells.asp).

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## Considerations for anion exchange method

Sulphate is a negative ion (anion) in solution. When you use anion exchange treatment, the resin in the unit will remove certain anions more readily than others. Sulphate is preferred over arsenic, nitrate, nitrite, and fluoride. If you need to reduce the levels of these anions when sulphate is present, the effectiveness of the unit may be reduced. The resin in the anion exchange unit may need to be regenerated more frequently. It is important that a detailed chemical analysis of your water be completed to determine if other substances are present that will affect treatment.

The presence of sulphate may cause any arsenic, nitrate, nitrite, or fluoride contained on the resin bed to rapidly detach, leading to higher levels in the treated water than the untreated water. It is important to follow instructions for resin regeneration and replacement when sulphate is present.

## FOR MORE INFORMATION

### Contact

Nova Scotia Environment at  
1-877-9ENVIRO  
or 1-877-936-8476

[www.gov.ns.ca/nse/water/](http://www.gov.ns.ca/nse/water/)

