

The drop on water

Hydrogen Sulphide

Hydrogen Sulphide (H_2S) is a dissolved gas that gives water a characteristic rotten egg taste and odour.

Sources

Hydrogen sulphide gas can occur naturally in groundwater. It may be produced from the decomposition of organic matter underground, such as decaying plant material, or by chemical reduction of sulphate by sulphate-reducing bacteria.

Hydrogen sulphide can be found in deep or shallow wells. It is often present in areas

- underlain by shale or sandstone
- near coal or peat deposits
- near oil fields

Another common source of hydrogen sulphide is the magnesium corrosion control rod present in many hot water heaters. It can chemically reduce naturally occurring sulphates to hydrogen sulphide.

An ion exchange treatment unit (water softener) is another possible contributor to the odour problem. The softened water is more corrosive, increasing the rate at which the magnesium rod is dissolved. This dissolved magnesium provides an energy source (food) to the sulphate-reducing bacteria, accelerating the rate at which hydrogen sulphide is produced and thereby increasing odour complaints.

QUICK FACTS

- Hydrogen sulphide gas may be found naturally in groundwater or may be related to a water treatment unit or the corrosion control rod of a hot water heater.
- Hydrogen sulphide gas has a noticeable smell, which may affect the taste of drinking water.
- Hydrogen sulphide can be detected through special laboratory testing.
- The Canadian drinking water quality guideline for hydrogen sulphide is an Aesthetic Objective (AO) of less than or equal to **0.05 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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Aesthetic Objective for Drinking Water ≤ 0.05 mg/L

Hydrogen sulphide at concentrations above 0.05 mg/L may affect the taste, smell, or colour of well water.

The Canadian drinking water quality guideline for hydrogen sulphide is an Aesthetic Objective (AO) of less than or equal to **0.05 milligrams per litre (mg/L)**.

Health Risks

Drinking water with hydrogen sulphide in very high concentrations can cause nausea, vomiting, and stomach pain. It is unlikely that a person would consume a harmful dose of hydrogen sulphide from drinking water, because of its unpleasant taste and odour.

Elevated hydrogen sulphide levels in groundwater may indicate that water quality problems exist that may cause other health problems.

Hydrogen sulphide can

- corrode metals such as iron, steel, copper, and brass
- tarnish silverware
- discolour copper and brass utensils
- cause yellow or black stains on fixtures
- discolour beverages made with water containing it
- alter the appearance and taste of cooked foods

Testing

If you suspect hydrogen sulphide is present in your well water, contact an accredited water testing laboratory. A specific laboratory test is necessary to identify hydrogen sulphide in well water. Find a list of accredited water testing laboratories at 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.

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.

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Solutions

If hydrogen sulphide is present above 0.05 mg/L in the first test, you should determine the source of the hydrogen sulphide.

Hydrogen sulphide is an aesthetic parameter. Aesthetic parameters may impair the taste, smell, or colour of water. Although hydrogen sulphide does not pose a serious health risk, its presence can indicate deteriorating groundwater quality and could indicate other problems with well water quality that may cause adverse health effects.

- Get a second test, taking a sample of water from the well before it enters the building. This will help determine whether the hydrogen sulphide is present in the groundwater or a source inside the building, such as a water heater.
- Inspect the well construction.

Sulphate-reducing bacteria convert naturally-occurring sulphate in water into hydrogen sulphide. Since sulphate-reducing bacteria are a common source of hydrogen sulphide, treatment to control this should be tried first. See our fact sheet on iron and sulphur bacteria for more information.

If the hydrogen sulphide is only present in the household hot water, the magnesium rod in the water heater may be the cause of the odour problem. The purpose of the magnesium rod is to prevent corrosion of the water heater. Removing or replacing the magnesium rod may reduce the odour. Consult a qualified plumber before making any adjustments to the water heater.

If the source of hydrogen sulphide does not pose health concerns, treating your water is optional. You may choose to treat your water to improve the taste, smell, or colour and make it more pleasing to consume.

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Treatment

Effective treatment options include

- adsorption
- aeration
- chlorination and filtration
- chlorination and activated-carbon filter
- greensand filtration
- oxidation and filtration

Buy a treatment system that has been certified to meet the current NSF standards for hydrogen sulphide reduction. 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.

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.

Considerations

If the hydrogen sulphide odour is strong when the water is first turned on in both the hot and cold water faucets and is more or less constant, the problem is likely to be hydrogen sulphide gas in the groundwater.

If hydrogen sulphide odour occurs in treated water (softened or filtered), and diminishes after a while or no hydrogen sulphide is detected in the non-treated water, it usually indicates the presence of some form of sulphate-reducing bacteria in the system.

If the hydrogen sulphide odour only occurs in the hot water, the problem is likely the magnesium rod in the hot water heater.

High concentrations of dissolved hydrogen sulphide can foul the resin bed of an ion exchange treatment unit (water softener).

FOR MORE INFORMATION

Contact

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

www.gov.ns.ca/nse/water/


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