

Hydrogen Sulfide (H₂S)

What You Need to Know

Water that is giving off a distinctive smell is most likely contaminated with hydrogen sulfide. H₂S, as it is also known, does not usually pose immediate health problems at the levels it is found in domestic drinking supplies. However, it is certainly an inconvenience—especially to one's nose.

Being informed is always an important step in safety issues. What follows are answers to popular H₂S questions.

What is hydrogen sulfide, and how does it form?

Sulfur-reducing bacteria present in ground water use sulfur as an energy source to chemically change sulfates to produce H₂S. The bacteria uses sulfur from decaying plants, rocks, or soil. They exist in environments that are oxygen-deficient such as deep wells and plumbing systems.

However, H₂S can exist naturally in ground water as well. It can enter surface water through springs and quickly escape into the atmosphere. H₂S crops up other ways too. The magnesium rod used in water heaters for corrosion control can chemically reduce sulfates to H₂S, and sewage pollution can be a source.

How can H₂S affect one's health?

H₂S can be toxic, but its strong odor usually allows for detection long before it reaches extreme levels. H₂S is flammable and poisonous. Such concentrations are not common, but if the gas is released in a confined area it can cause nausea, illness, and—in extreme situations—death.

What effects does H₂S have on the environment?

H₂S can be corrosive to metals such as iron, steel, copper, and brass, and it can cause yellow or black stains on kitchen and bathroom fixtures. It can discolor and alter the taste of beverages and food prepared with contaminated water.

How can H₂S be detected?

The nose is the best source. H₂S is one of the few water contaminants that human senses can detect at low concentrations. The odor is most noticeable when water is first turned on or heated. Thus, a shower can be an unpleasant experience.

The odor can be detected at levels as low as 0.5 parts per million. At less than 1 ppm, H₂S will give water a musty odor. At 1 to 2 ppm, it will have an odor similar to rotten eggs. Levels are usually less than 10 ppm.

Since H₂S is dissolved in water and vaporize from it, samples must be analyzed at the site or stabilized before sending them to a laboratory. Several test kits are available for less than \$10.

How can H₂S be treated?

There are various methods. They should be chosen based on the level of H₂S, the amount of water being treated, the levels of iron and manganese, and bacterial contamination. H₂S can be reduced or removed by activated carbon filtration, shock chlorination, oxidizing chemical injection, oxidizing filtration, and water heater modification. All are discussed below:

- *Activated carbon filters* are good when H₂S is present in low levels. The H₂S is absorbed onto the surface of the carbon particles.
- *Shock chlorination* may reduce, but not eliminate, the H₂S-producing bacteria. It involves mixing a sufficient amount of a chlorine-based chemical with the water to create a solution containing 200 ppm of chlorine throughout the water system. It is left in the system for several hours. The system must be flushed with fresh water when the process is complete.
- *Oxidation* removes H₂S concentrations exceeding 6 ppm. It can be done by aeration, chlorination, ozone, and potassium permanganate. There should be at least 20 minutes of contact between the chemical and the water.
- *Oxidizing filters* will work for concentrations up to 6 ppm. The filter contains sand with a manganese dioxide coating that changes H₂S gas to tiny particles of sulfur that are trapped inside the filter.
- *Water heater modification* is necessary when H₂S is causing an odor within the water heating system. Replacing the magnesium corrosion control rod with one made of aluminum or other metals usually improves the situation.

Where can I get more information?

For more information on your private water well, contact your local contractor. Also, visit the Web site of the National Ground Water Association, www.ngwa.org, and its site just for well owners, www.wellowner.org.



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