

# Hydrogen Sulfide (H<sub>2</sub>S)

## What You Need to Know

Water that is giving off a distinctive smell is most likely contaminated with hydrogen sulfide. H<sub>2</sub>S, 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 H<sub>2</sub>S questions.

### What is hydrogen sulfide, and how does it form?

Sulfur-reducing bacteria present in groundwater use sulfur as an energy source to chemically change sulfates to produce H<sub>2</sub>S. 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, H<sub>2</sub>S can exist naturally in groundwater as well. It can enter surface water through springs and quickly escape into the atmosphere. H<sub>2</sub>S crops up other ways too. The magnesium rod used in water heaters for corrosion control can chemically reduce sulfates to H<sub>2</sub>S, and sewage pollution can be a source.

### How can H<sub>2</sub>S affect one's health?

H<sub>2</sub>S can be toxic, but its strong odor usually allows for detection long before it reaches extreme levels. H<sub>2</sub>S 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 H<sub>2</sub>S have on the environment?

H<sub>2</sub>S 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 H<sub>2</sub>S be detected?

The nose is the best source. H<sub>2</sub>S 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, H<sub>2</sub>S 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 H<sub>2</sub>S is dissolved in water and vaporizes 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 H<sub>2</sub>S be treated?

There are various methods. They should be chosen based on the level of H<sub>2</sub>S, the amount of water being treated, the levels of iron and manganese, and bacterial contamination. H<sub>2</sub>S 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 H<sub>2</sub>S is present in low levels. The H<sub>2</sub>S is absorbed onto the surface of the carbon particles.
- *Shock chlorination* may reduce, but not eliminate, the H<sub>2</sub>S-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 H<sub>2</sub>S 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 H<sub>2</sub>S gas to tiny particles of sulfur that are trapped inside the filter.
- *Water heater modification* is necessary when H<sub>2</sub>S 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](http://www.ngwa.org), and its site just for well owners, [www.wellowner.org](http://www.wellowner.org).