



## HOUSING & ENVIRONMENT

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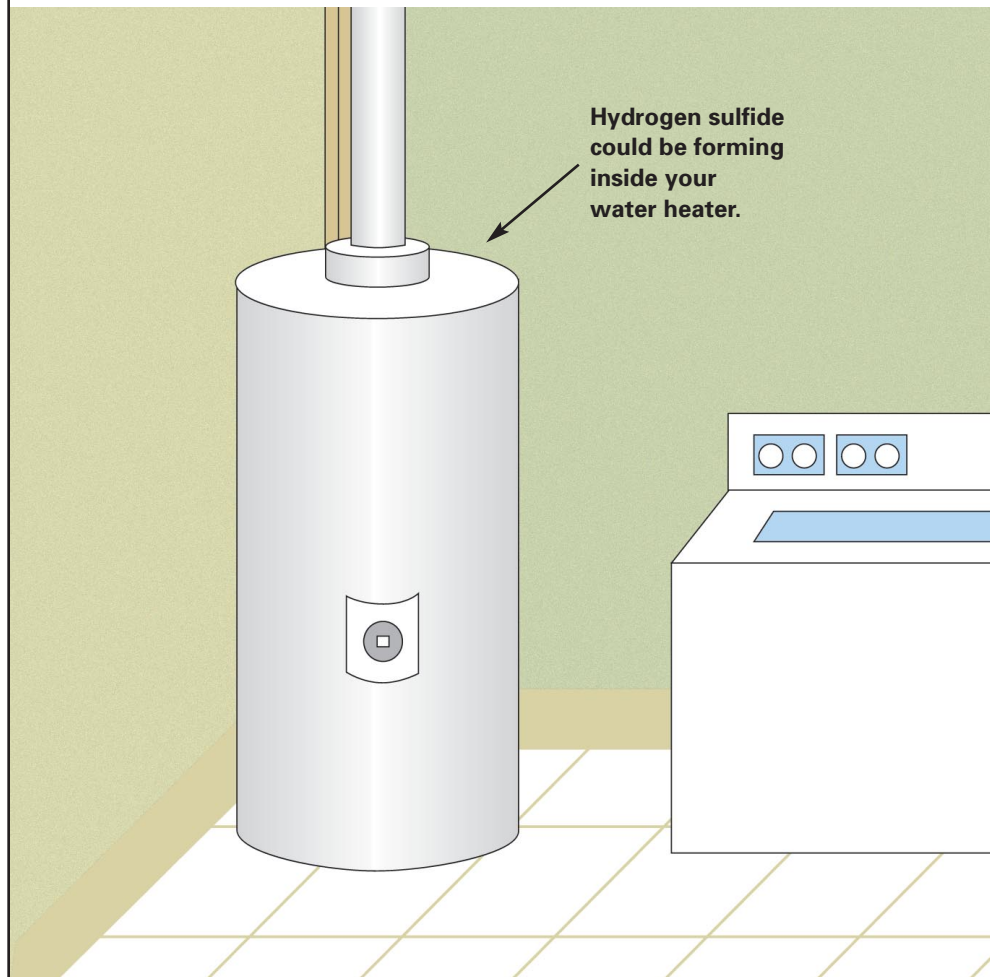
# YOUR HOUSEHOLD WATER QUALITY: HYDROGEN SULFIDE AND SULFATE

### WHAT ARE HYDROGEN SULFIDE AND SULFATE?

- **Hydrogen sulfide** is a gas that has the unmistakable odor of rotten eggs. It is produced from decomposing plant and animal tissue. At high concentrations in the air hydrogen sulfide is toxic, but it is usually just at nuisance levels in well water and does not cause health problems.

Hydrogen sulfide is extremely corrosive to metals. It will quickly corrode even stainless steel. Wells constructed with steel casing and houses plumbed with copper pipes will have a shortened lifetime. Hydrogen sulfide will react with the silver in true silverware creating a coal-black tarnish. It can also react with the resin bed of a water softener, and if sulfur-loving bacteria enter the treatment system a black slime will be produced.

- **Sulfate** comes from naturally occurring minerals in soils, rocks, and sediments. Sulfate is another form of sulfur that does not produce gas and is odorless. High levels of sulfate can act as a laxative to some people, cause dehydration, and be especially detrimental to the health of infants. A high level of sulfate in water (in excess of 250 parts per million) requires treatment of drinking water before use.



## WHY IS HYDROGEN SULFIDE IN MY WATER?

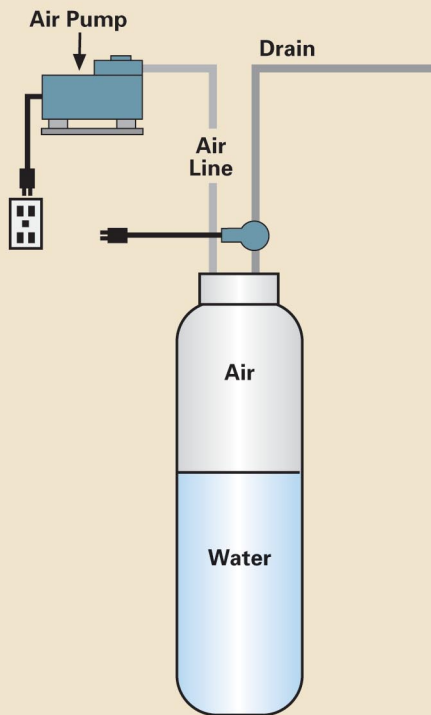
When plant or animal tissue is decomposed underground where oxygen is not available, sulfur-containing compounds and minerals can be changed into hydrogen sulfide. This gas is very insoluble in water. When water is underground this gas is trapped *within* the water. When the water is pumped to the surface, the hydrogen sulfide gas is free to escape and this is why it is so easy to smell (from both hot and cold faucets). If you detect the smell of hydrogen sulfide from only the hot water faucet, your water heater may be causing the problem. The magnesium corrosion control rod (anode rod) inside the water heater can react with sulfate to form hydrogen sulfide. This problem can be eliminated or reduced by replacing the magnesium rod with one made of aluminum.

## CAN I HAVE MY WATER TESTED BY A LABORATORY FOR HYDROGEN SULFIDE AND SULFATE?

It is very difficult to test for hydrogen sulfide in a laboratory because the hydrogen sulfide escapes very quickly from water and may be gone by the time the water reaches the laboratory. The rotten egg smell of hydrogen sulfide is unmistakable, but if a test is needed to determine the level, kits are available for onsite measurement of the hydrogen sulfide.

The presence of sulfate is easily determined in laboratory water tests. If you send your water to a laboratory for a test package that includes multiple tests, make sure that the test package you selected includes sulfate.

### Example of an Aeration System



## WHAT CAN BE DONE TO REMOVE HYDROGEN SULFIDE OR SULFATE FROM WELL WATER?

The same characteristic that causes hydrogen sulfide gas to rapidly escape from the water and cause an odor can be exploited to remove this gas from the water. This treatment process is known as "aeration." Aeration is done either with a tank specifically designed for hydrogen sulfide removal or by replacing the bladder style pressure tank with an older-style pressure tank. Aeration systems designed specifically for hydrogen sulfide removal have an added advantage of removing high levels of iron and manganese, provided a filtration system is added after the aeration process.

Older style pressure tanks have a pocket of air in the top of the tank that allows the hydrogen gas to escape before the water is distributed throughout the house. The disadvantages of this method are:

1. it may not be effective during periods of high water usage, and
2. the air pocket in the top of the tank may frequently be lost and require the addition of pressurized air to the tank.

The advantage of the "aeration" method is that it is the lowest cost alternative. There are other more expensive treatments for hydrogen sulfide removal that include oxidation with chlorine or permanganate and filtration through activated carbon.

Sulfate can be removed by distillation, reverse osmosis (RO), or anion exchange resin. It is not necessary to remove sulfate from all the water--only drinking water needs to be treated.

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