Hydrogen Sulfide in Drinking Water

AEX-319-97

Water containing hydrogen sulfide usually does not pose a health risk, but does give water a nuisance "rotten egg" smell and taste. Water supplies with as little as 1.0 ppm (part per million) hydrogen sulfide are corrosive, may tarnish copper and silverware, and occasionally release a black material that stains laundry and porcelain.

Source

Hydrogen sulfide is formed by sulfur bacteria that may occur naturally in water. These bacteria use the sulfur in decaying plants, rocks, or soil as their food or energy source and as a by-product produce hydrogen sulfide. The sulfur bacteria do not cause disease, but their presence in water can cause a bad taste or odor.

Water heaters can also be sources of foul odors stemming from hydrogen sulfide. A magnesium rod is often placed in the tank by the manufacturer to prevent water heater corrosion. Sulfur that is dissolved in water can react with the magnesium rod forming hydrogen sulfide. The magnesium rod can be replaced with an aluminum one or removed completely. Removal however, may void the company's warranty.

Tests

Since small amounts of hydrogen sulfide can be detected in water by smell and taste, laboratory testing is not needed to detect its presence. Laboratory tests for hydrogen sulfide are possible if care is taken in collecting the sample. Special sample bottles must be used that contain a stabilizing chemical that prevents the hydrogen sulfide from escaping when the bottle is opened at the lab.

Always request sample bottles from the laboratory to use in collecting any water sample. For detailed information on water testing, obtain fact sheets AEX 314, "*Water Testing*," and AEX 315, "*Where to Have Your Water Tested*," from your county Extension office.

Treatment

Chlorination

Chlorine will quickly react with hydrogen sulfide to form a tasteless, odorless, yellow particle. A small amount of chlorine, usually household laundry bleach, can be automatically added to any size water system to remove hydrogen sulfide. The yellow sulfur particles that remain in the water, will form a yellow film on clothing and fixtures. A sand or aggregate filter can remove the yellow particles (Figure 1). Backwashing the filter is necessary every few days, or every few weeks, to flush out the accumulated sulfur particles.

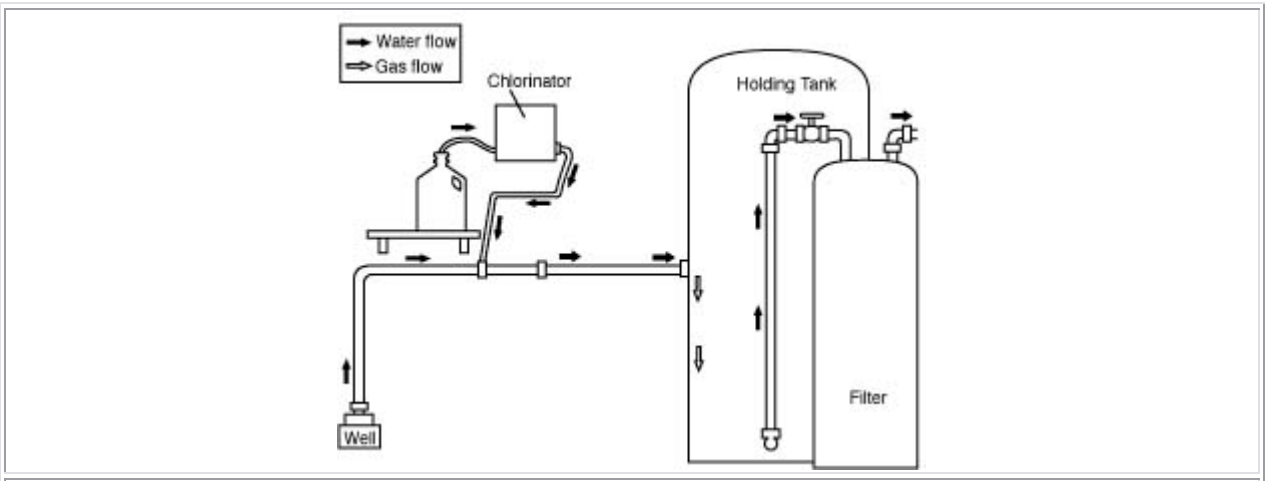

Figure 1. Chlorination system for hydrogen sulfide removal. (Adapted from Planning for an Individual Water System, Fourth Edition, with permission from the American Association for Vocational Instructional Materials.)

Aeration

Oxygen in the air will react with hydrogen sulfide to form an odorless, dissolved form of sulfur called sulfate. Some yellow sulfur particles may also form after the water is aerated. In an aeration system, compressed air can be injected into the water system (Figure 2). The air must then be removed from the water to prevent knocking or air-blocks in the water system. Another approach is to spray water into a non-pressurized tank. A second pump is needed to repressurize the water system (Figure 3). It is common for odors to be present near these aeration systems as hydrogen sulfide gas is released from the water.

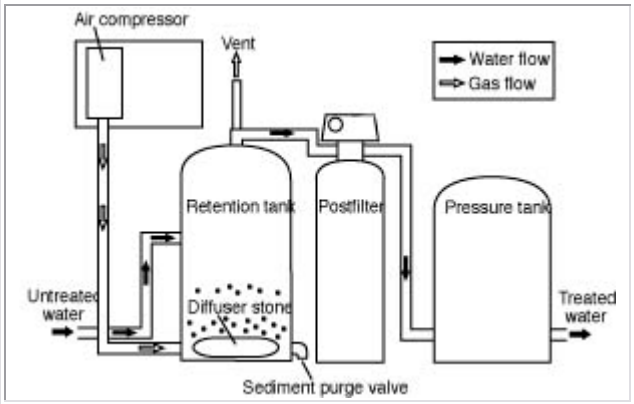

Figure 2. Compressed air aeration system. (Adapted with permission from Home Water Treatment, NRAES-48, published by NRAES, Cooperative Extension, 152 Riley-Robb Hall, Ithaca, New York 14853-5701. 607-255-7654.)

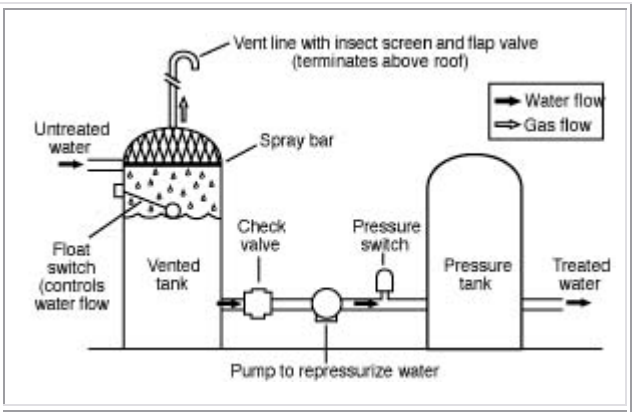

Figure 3. Spray aeration system. (Adapted with permission from Water Well Journal, Westerville, OH. 800-332-2104. Copyright 1996. All rights reserved.)

Carbon Filters

Very small amounts of hydrogen sulfide can be removed from water with activated carbon filters. The hydrogen sulfide is adsorbed onto the surface of the carbon particles. Periodically, the activated carbon filter must be replaced depending on the amount of hydrogen sulfide in the water. Moderate to high levels of hydrogen sulfide in water will require very frequent filter replacement.

Odors from Hot Water Only

"Rotten egg" odors from hydrogen sulfide are sometimes only present in hot water. This may indicate a reaction with the magnesium rod in the water heater. Consider either removal or replacement with an aluminum rod as a remedy. Sometimes hot water will have a "sour" smell, similar to the smell of an old damp rag. This happens when, in an effort to save energy or to avoid blending hot and cold water, the thermostat of the water heater is lowered. Odor-causing bacteria live and thrive in warm water and can infest the water heater. This is corrected by returning the thermostat to its recommended temperature, because the odor-causing bacteria are killed at the higher water temperature (at or above 140 degrees). Caution: Be sure the water heater has an operable pressure relief valve before increasing the water temperature. If you want to keep your water heater temperature at a lower setting because scalding from hot water is a concern, each time the odor returns, increase the water temperature for a few hours to kill the odor-causing bacteria. Then flush the very hot water out of the tank and lower the temperature back to the desired level.

Purchasing Hydrogen Sulfide Equipment

Hydrogen sulfide problems in water can be difficult to treat. Sometimes several different approaches may need to be tried to find a system that works for a particular water system. Other water quality problems, such as iron, corrosive water, or high levels of dissolved minerals, can complicate the selection and performance of water treatment equipment.

Water treatment equipment should always be purchased from a reputable dealer who carries a wide range of equipment and can work to find the most appropriate system. Consider renting the equipment at first to insure that it will meet the need.
