

wellcare[®] information for you about

SULFUR & WELL WATER

What is Sulfur?

Two forms of sulfur are commonly found in drinking water: hydrogen sulfide and sulfate-reducing bacteria. Both forms are nuisances that usually do not pose a health risk at the concentrations found in domestic wells.

Hydrogen sulfide gas occurs naturally in some groundwater that contains decaying organic matter, such as wetlands, marshes, swamps, riverbeds. It may be found in deep or shallow wells. Hydrogen sulfide is often present in wells drilled in shale or sandstone, or near coal or peat deposits or oil fields.

Hydrogen sulfide can cause yellow or black stains on kitchen and bathroom fixtures. Coffee, tea and other beverages made with water containing hydrogen sulfide may be discolored and the appearance and taste of cooked foods can be affected.

Sulfate is a combination of sulfur and oxygen and is part of naturally occurring minerals in some soil and rock. The mineral dissolves over time and is released into ground water. Sulfur odor is produced when a non-harmful sulfur-reducing bacteria digests a small amount of the sulfate mineral.

What are the health effects of Sulfur?

The Environmental Protection Agency (EPA) considers sulfur a secondary water contaminant, with no direct threat to human health. Sulfate gives water a bitter taste and can have a laxative effect that may lead to dehydration. Hydrogen sulfide gives water a “rotten egg” odor and taste and can cause nausea.

The EPA sets standards for secondary water contaminants based on taste, odor, color, corrosiveness, foaming and staining properties. Hydrogen sulfide is not regulated because any concentration high enough to pose a health hazard will also make the water too unpalatable to drink. The EPA’s secondary limit for sulfate in drinking water is 250 parts per million (ppm). If you suspect contamination or experience illness, stop drinking and cooking with the water immediately and do not resume until testing has proven it to be safe to use. Always seek advice from your medical doctor if you have any health concerns.

What do I test for Sulfur?

Testing for hydrogen sulfide can be difficult because the gas escapes into the atmosphere so quickly. On-site testing is the most accurate method for determining hydrogen sulfide concentration, especially if the odor is excessive. Hydrogen sulfide concentrations greater than 5 mg/L are more difficult to treat and could require special testing methods to assure accuracy.

Sulfate-reducing bacteria is rarely tested, however testing for sulfate ion (mineral) concentration is. The premise is: if a rotten egg odor is present and the sulfate ion concentration is excessive – greater than 150 mg/L – the odor is created by sulfate-reducing bacteria.

Nonetheless, laboratory testing is available in most states for both forms of sulfur. Hydrogen sulfide is corrosive to metals such as iron, steel, copper, and brass which may warrant further water testing. Contact your state or local health department for a list of state-certified laboratories in your area or use [our interactive map](#).

What are the treatments for Sulfur in well water?

Treatment options depend on the form (whether hydrogen sulfide or sulfate-reducing bacteria) and quantities of the “rotten egg odor-producing” contaminants. Hydrogen sulfide treatment is with chlorination or aeration followed by filtration. Often, treatment for hydrogen sulfide is the same as for iron and manganese, allowing the removal of all three contaminants in one process. High concentrations of dissolved hydrogen sulfide can foul the resin bed of an ion exchange water softener therefore would not be recommended in most cases when sulfur is present.

Water heater anode rods contain some sulfate so, in the presence of sulfate-reducing bacteria, a rotten egg odor is created in the hot water only. If this occurs, the first course of action is to replace the anode rod which limits the sulfate and therefore stops the odor. Contact your licensed plumber for guidance. Please note that changing or removing the anode rod can void the water heater warranty. It is best to contact the water heater manufacturer for details.

Sulfate-reducing bacteria is treated with continuous chlorination. Removing sulfate mineral is difficult and usually not feasible, so chlorination kills the bacteria instead. The chlorination process involves a chemical feed pump system that injects a chlorine solution into the inlet of a retention tank that must be installed in the house piping. The retention tank must hold enough water to provide a 20-minute time period for the chlorine to react with the bacteria. The capacity needed for the retention tank can be calculated by multiplying the well pump output times 20. A continuous chlorine residual of 1.0 mg/L is required at the outlet of the retention tank to assure the bacteria were destroyed. Since chlorine can be combined with natural organic matter, it's always recommended that an activated carbon filter be installed after the retention tank to remove the chlorine.

Contact a certified water treatment professional for guidance. To locate a certified water treatment professional in your area, visit [WQA's](#) website. Treatment systems should be certified by NSF or Water Quality Association (WQA) when available. To find treatment systems that are certified visit [NSF](#) or [WQA](#) websites. It is necessary to maintain treatment devices as specified by the manufacturer or your water treatment professional. You should also retest your water after treatment is installed and after maintenance to confirm the effectiveness of the device.

For More Information on Sulfur & Well Water

Contact your licensed well contractor, local health department, or the [wellcare®](#) Hotline for more information on Sulfur.



Information to help maintain and protect your water well system:

[wellcare®](#) is a program of the [Water Systems Council \(WSC\)](#). WSC is the only national organization solely focused on protecting the health and water supply of an estimated 23 million households nationwide who depend on private wells (according to the U.S. EPA).

This publication is one of more than 100 [wellcare®](#) information sheets available FREE at www.watersystemscouncil.org.

Well owners and others with questions about wells and well water can contact the [wellcare®](#) Hotline at 1-888-395-1033 or visit www.wellcarehotline.org to fill out a contact form or chat with us live!

JOIN THE WELLCARE® WELL OWNERS NETWORK!

By joining the FREE [wellcare®](#) Well Owners Network, you will receive regular information on how to maintain your well and protect your well water.

Contact us at 1-888-395-1033 or visit www.wellcarehotline.org to join!