

# Quality Water

Program #6—on a video containing SIX PROGRAMS about safe and effective water systems

## Sulfate—Sulfide

*This VIEWER REFERENCE GUIDE  
is yours to keep!  
DO NOT RETURN IT  
when you return the video.*

### *What kinds of sulfur are commonly found in drinking water supplies?*

- ❑ *Hydrogen sulfide gas.* This is a naturally occurring gas produced by sulfate-reducing (sulfide-producing) bacteria that live in some wells, aquifers, and plumbing systems. These bacteria are not known to cause disease.
- ❑ *Sulfate.* This is a naturally occurring mineral in some soil and rock formations and is dissolved by groundwater. Sulfate ranges from very low (10mg/L or less) to very high (over 1000 mg/L) in Kansas. Values of 40 to 250 mg/L are common.

### *What are symptoms of hydrogen sulfide and sulfate in water?*

- ❑ *Hydrogen sulfide*
  - A sulfur or rotten egg odor and flavor. Most people object to this odor even at low concentrations. At high concentrations, it can cause death.
  - Causes plumbing system corrosion, perhaps leaks in plumbing, and short plumbing life.
- ❑ *Sulfate*
  - Scale buildup in the plumbing system, especially the water heater.
  - The water has a laxative effect on livestock and humans who are unaccustomed to sulfate in their drinking water.

NOTE—With time, people and livestock usually become acclimated to sulfate, and the laxative effect disappears. However, the opposite effect (constipation) may occur when switching to low sulfate water.

### *How can sulfate be removed from water?*

- ❑ *There are three choices for removing sulfate. The option you choose depends mainly on how much water you need to treat and the cost.*

NOTE—An alternative water supply is often less expensive than treatment to remove minerals.

A. For SMALL amounts of water, usually drinking and cooking only.

- ❑ *Distillation*
  - Water is boiled to form steam while minerals, such as sulfate, are left behind in the boiling chamber. Minerals do not vaporize at temperatures used to boil water.
  - Steam is collected and condensed to form pure water without minerals.
  - See Extension bulletin “Distillation,” MF-885.

NOTE—Other impurities such as some organic chemicals with boiling temperatures near that of water may be in distilled water.

- ❑ *Reverse osmosis*
  - Tiny pores in a reverse osmosis membrane permit water molecules to squeeze through under pressure, leaving minerals such as sulfate behind.
  - Reject water with minerals has to be wasted to keep minerals flushed away.
  - Typical household units produce 5 to 10 gallons per day and waste up to 10 gallons of water or more for each gallon of product.
  - See Extension bulletin “Reverse Osmosis,” MF-884.

B. For LARGE amounts of water, household and livestock.

*Anion exchange*

- Mechanism works like a water softener except with anion (negative charge) exchange resin. Ion-exchange resin, contained in the media tank, adsorbs sulfate, releasing chloride ions in its place.
- When resin is loaded to full capacity with sulfate, treatment ceases. Then resin must be “regenerated” with salt (sodium chloride) brine to restore treatment capacity.
- Product water will likely taste salty.
- Requires lots of salt and produces brine waste.

*Reverse osmosis*

- Commercial size units work on the same principle as a small household unit.
- Units have a booster pump for improved efficiency and consequently usually waste less than a gallon for every gallon of product.
- See Extension bulletin “Reverse Osmosis,” MF-884.

## ***Are there ways to prevent hydrogen sulfide from forming?***

*Shock chlorination.* This treatment reduces, but probably will not eliminate the sulfate-reducing, sulfide-producing bacteria.

- Place strong chlorine bleach solution in the well.
- Recirculate water in the well to thoroughly mix chlorine and to disinfect inside the well.
- Open water outlets to draw chlorinated water into all parts of the plumbing system.
- Leave in system for several hours or overnight.
- Flush excess chlorine. Avoid putting more than 50 gallons into the septic system. Do not put high chlorine on vegetation.

NOTE—Some water users have found that repeat shock chlorine treatment may be necessary after a few weeks to a few months to control hydrogen sulfide.

*When odor is associated mainly with hot water system,* try replacing the magnesium corrosion control rod in the water heater with one made of aluminum or other metal; this may eliminate or reduce the odor.

NOTE—This may affect heater warranty, so contact the manufacturer for information about the warranty.

## ***If attempts to control hydrogen sulfide are not successful, are there ways I can remove it from my water?***

*For LOW LEVELS of hydrogen sulfide*

- Use an activated carbon filter. The filter must be replaced periodically to maintain performance. Frequency of replacement will depend on daily water use and concentration of hydrogen sulfide in the water.

*For HIGH LEVELS of hydrogen sulfide*

- Use an oxidizing filter (same as iron filter). This filter contains sand with a manganese dioxide coating which changes sulfide gas to tiny particles of sulfur. Sulfur particles are trapped inside the sand filter. The sand filter must be backflushed regularly, and treated with potassium permanganate to maintain the oxide coating.
- Inject an oxidizing chemical (such as chlorine), and filter out sediment produced. Inject chlorine usually directly into the well. The sulfide is oxidized forming sulfur particles which can be removed by a sediment filter. An activated carbon or KDF filter may be necessary to remove excess chlorine, especially from drinking water.
- Air Stripping can drive off hydrogen sulfide. Hydrogen sulfide is a gas that readily vaporizes from water as it trickles downward through a column while air moves upward through the column.

**Adapted from Iowa Extension Publication written by Thomas D. Glanville**

G. Morgan Powell  
Natural Resource Engineer

Michael H. Bradshaw  
Extension Specialist  
Health and Safety

### **Sources of additional information**

- Your local health department or county Extension office
- Your local library
- NSF International, P.O. Box 130140, Ann Arbor, MI 48113-0140 (313-769-8010)
- Water Quality Association, 4151 Naperville Rd., Lisle, IL 60532 (708-505-0160)

*This publication is distributed in electronic format only. Printed copies are not available from the Distribution Center at Kansas State University.*