http://waterheatertimer.org/How-to-troubleshoot-electric-problems-with-water-heater.html

Smelly Water and the Rotten Egg Odor

The incidence of rotten egg odor or black water in hot water lines is due to the reaction of sulfates and micro-organisms in the water that create Hydrogen Sulfide (H_2S). This is a water chemistry condition, rather than a water heater problem.

Although there is very little literature associating odors and sulfate reduction with magnesium, there is reference to sulfate-reducing bacteria known as '***desulfovibrio***'. These bacteria cannot grow in the presence of atmospheric oxygen, which may account for their not being noticed in cold water supplies. When the same water is heated, they odor becomes noticeable.

How can H_2S be detected?

Just take a swift sniff. A simple check for the cause of the odor is to draw enough hot water to notice the odor. H_2S 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. A shower can be an unpleasant experience with hydrogen sulfide present. The odor can be detected at levels as low as 0.5 parts per million (ppm). At less than 1 ppm, H_2S 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. The source of the odor is in the cold water supply, such as untreated rural water systems or well water; but does not present itself until heated

What is hydrogen sulfide, and how does it form?

Sulfur-reducing bacteria that are naturally present in ground water use sulfur as an energy source to chemically change sulfates to produce H_2S. The bacteria uses sulfur from decaying plants, rocks, or soil. They exist in environments that are oxygen-deficient (not enough oxygen) such as deep wells and plumbing systems. However, H_2S can exist naturally in ground water as well. It can enter surface water through springs and quickly escape into the atmosphere.

Some of these waters have excessive sulfate content along with various strains of sulfate reducing bacteria. These bacteria, harmless to health, will react in stagnant water that has been depleted of oxygen and will produce hydrogen sulfide gas, utilizing the hydrogen ion from the anode cathode reaction. This problem is more prevalent in softened water containing sodium in place of calcium and magnesium. The anode may have some affect because the greater activity of the anode, the greater amount of the hydrogen ion and hydrogen sulfide gas. These bacteria can be killed with adequate additions of chlorine such as in a chlorine feeder. This will usually eliminate the odor problem.

How can H_2S be treated?

There are two ways to eliminate an odor problem. They are listed in the order of preference.

1. **Chlorination** - by means of a continuous chlorine feeder; or periodic flushing with common household bleach. This process is 100% effective only if a continuous chlorine feeder is installed.

2. **Install a new Rheem R-TECH anode rod** after the water heater has been flushed with household bleach. This process may not be 100% effective because, without continuous chlorination, bacteria are still allowed to grow inside the tank. The Rheem R-Tech anode reduces the overall anode activity thereby reducing the availability of hydrogen ions.

Chlorination of Water Heater Tanks

1. Turn off the manual electrical switch or shut off main gas supply.
2. Close the cold-water inlet valve at the heater.
3. Open a nearby hot water faucet and the T&P valve to relieve tank pressure.
4. Drain the heater of enough water to compensate for the bleach. Use a hose connected to the drain valve if an open drain is not adjacent to the heater.
5. Remove relief valve, anode rod or disconnect the hot water outlet pipe from the heater.
6. Pour one gallon of bleach for every 30 gallons of water heater tank capacity. Use the relief valve, anode rod or hot water outlet pipe opening. Re-pipe the heater and close the T&P valve.
7. Open the cold-water inlet valve at the heater and fill the tank with water. Observe the water level through the closest hot water faucet. Close inlet valve when the tank is full.
8. Leave the bleach mixture in the heater for one hour.
9. After one hour, open <u>all</u> the hot water faucets and allow the bleach mixture to clean the hot water supply pipes. Drain the remaining bleach mixture from the tank through the heater drain valve.
10. Close the heater drain valve, make sure the cold water inlet valve is open, and completely fill the tank with fresh water. Leave the water in the tank for 15 minutes.
11. After 15 minutes, purge the hot water supply lines and drain the water from the tank through the heater drain valve. Check anode rod for serviceability; replace with a new Rheem R-TECH anode rod if there are signs of deterioration. Close the heater drain valve, make sure the cold-water inlet valve is open, and completely fill the tank with fresh water.
12. Make sure you purge all the air from the hot water lines from the open hot water faucets. Close the hot water faucet after all the air is out of the system.
13. Check for water leaks at all fittings used; repair as necessary.
14. Turn on the manual electrical switch or gas valve from step 1 above. (Ensure tank is full of water to prevent dry firing.)
15. Check for normal water heater operation.