Using Your Senses to Identify Water Problems

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Many people determine the quality of the water they consume by its color and how it smells or tastes. Although these are important criteria, they are primarily aesthetic properties of the water. A glass of water may not be clear or smell or taste good, but it still could be suitable to drink from a health standpoint.

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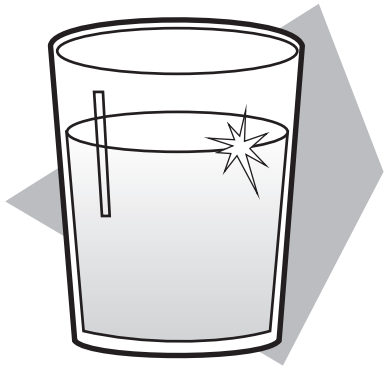
The safety of a water supply for human or animal consumption can be determined only by laboratory tests. However, the color, smell and taste of water can provide important clues to the cause of the problem and selection of water treatment devices to improve the quality of the water. However, you must realize that water fixtures, plumbing materials, water heaters, pressure tanks and the source of the water all can affect the color, smell and taste of water.

The following guidelines will help determine problems with the water and the most likely cause. You will need a clear sample container and your senses of sight, smell and taste.

First, fill the clear container at the site where you noticed the problem. The problem may not be with the water source (public water system or well) but with a fixture in the house. Take a second "raw" water sample. The raw water sample should be obtained at the point where the water enters the house or building. If you have a well, obtaining a water sample directly from the well is preferred. If the problem is not present in the raw water sample, then take a sample between the raw water source and the point where it is noticeable.



Color and Appearance

1. The water is clear when first drawn and then develops a **reddish hue**.

   This indicates a significant amount of dissolved iron in the water.

2. The water has a **reddish hue** when first drawn and then clears after standing for 24 hours.

   This indicates a significant amount of particulate iron in the water. This may be due to galvanized iron pipe in the building or a rusted pressure tank, well casing or pump.

3. The water color varies from **yellow to dark brown** even after softening and/or filtering and does not clear up after standing for 24 hours.

   This indicates the presence of tannins (humic acid) in the water. This is common where water passes through coal veins, peaty soils and decaying vegetation.

4. The water color can vary from a **blackish** hue to almost black when first drawn but clears after standing for 24 hours.

   This indicates a significant amount of dissolved manganese in the water.

5. The water looks "**milky**" but clears from the bottom up after a few minutes.

   This is an indication of dissolved air in the water. This condition often is associated with the water supply system and is caused by problems such as the well pump sucking air or a malfunctioning pressure tank.

6. **Metal sinks, utensils, pipes**, etc., are blackened, tarnished or pitted.

   This indicates elevated amounts of salt (chlorides and sulfates) or hydrogen sulfide gas in the water.

7. **Green stains** appear on sinks and other porcelain bathroom fixtures. The water has a blue-green tinge.

   This indicates acidic water (pH below 6.8) that is reacting with brass or copper pipes and fittings.

8. You find **suspended particles** in water.

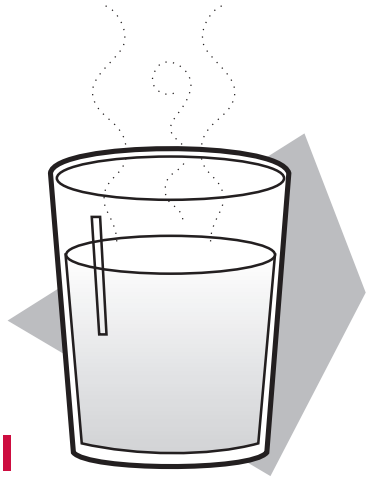
   This usually is caused by riled-up water in the water supply, sand pumping from a well or debris left in the piping after repairs.

9. **Soap curds** (a gel-like mixture of soap, calcium and magnesium) and lime **scum** (white deposits) appear in wash basins and bathtubs. **Off-white scale** deposits are visible in coffee pots, teakettles and on the ends of plumbing fixtures (faucet, shower head, etc.).

   These indicate the water is "hard" due to elevated amounts of calcium and magnesium salts in the raw water supply.

10. **Aluminum** cookware **is stained.**

    This indicates a high dissolved mineral content and high alkalinity in the raw water.



Smell

1. You smell **chlorine**.

   This can be a normal smell for public water supplies but indicates excessive amounts of chlorine were injected into private water supplies.

2. You notice a **fishy**, musty or earthy smell.

   This usually indicates harmless organic matter. This smell commonly is associated with surface water supplies, but some private shallow wells can have this smell, especially after receiving a significant amount of rain.

3. You get a **rotten-egg** odor from the raw water tap or directly from the well.

   This indicates a dissolved hydrogen sulfide gas is in the raw water (before it comes into your home). The gas is formed from decomposing underground deposits of organic matter.

4. You notice a **rotten-egg** odor from the hot and cold water tap following water softener treatment and not in untreated water.

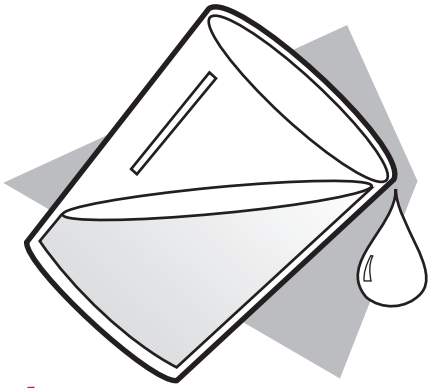
   This indicates sulfur bacteria in the water softener. If the smell is strong initially and diminishes after the water has run, the problem may be sulfur bacteria in the well.

5. You get a **rotten-egg** odor only from the hot water tap.

   Sulfates present in the raw water react with the magnesium anode (a metal rod used to reduce corrosion of the water heater tank), which causes hydrogen sulfide gas. This can be corrected by removing the anode or replacing it with an aluminum anode. Another cause for this odor may be sulfur-reducing bacteria, which chemically change natural sulfates in water to hydrogen sulfide on the hot-water side of the distribution system.

6. The water foams when drawn and you notice a **detergent odor**. You also may notice a septic odor occasionally.

   These usually indicate the water supply is receiving leakage from a sewer system. Getting a bacterial analysis immediately is imperative.



Taste

1. The water has a **salty** flavor that may have a laxative effect in some situations.

   This indicates a high salt content (primarily sodium sulfate and magnesium sulfate) in the water.

2. You notice a **metallic** taste.

   This may indicate a high concentration of manganese or possibly other metals.

Correction of the Water Problem

Once your water problem has been identified, you can select a treatment method to correct or minimize the problem. Before purchasing a treatment system, have your water analyzed by a state-certified laboratory to determine the quantity of organic matter or dissolved minerals in your water. The most common water tests are for:

- Coliform Bacteria
- Nitrates
- pH
- Total Dissolved Solids
- Hardness
- Iron and Manganese

After the water is analyzed, you can use the following chart to determine what treatment methods you need to correct the problem. From the guidelines in the previous chart, you may have identified more than one problem. If this is the case, you may need more than one type of treatment. For example, water with a smell also may be slightly yellow, brown or red. Many reputable water treatment companies have equipment that will treat more than one problem.

Raw Water Problem	Common Treatment Method
Bacterial contamination	Do not use the water until the source of contamination is found and corrected or removed. If you have to use the water, make sure either to boil it or treat with a disinfectant such as iodine or chlorine.
Sediment, rust, fine sand, clay, suspended iron particles	Remove using appropriate-sized sediment filter or sand filtration.
Odor and taste other than rotten-egg smell	Correct with activated carbon filters.
Hydrogen sulfide gas (rotten-egg smell)	For cold-water odors, use chlorination followed by sedimentation filter or use an oxidation filter (sometimes called an aeration filter) followed by an activated-carbon filter to remove excess chlorine. Remove or replace magnesium anode if odor is in hot water.
Small amounts of dissolved iron and manganese	Can be removed with a common water softener. The water softener manufacturer should have several models that list the amount of iron removal in grains per gallon.
High amounts of dissolved iron and/or manganese	Remove using a properly rated iron and manganese treatment device. Cartridge-type devices are available to remove amounts of iron and manganese less than 5 milligrams per liter (same as 5 parts per million).
Hard water	Treat using a softener rated to handle the grains per gallon of hardness in the water.
Acid water (pH less than 5.0)	Treat with an acid-neutralizing filter (adds calcium carbonate).
Alkaline water (pH greater than 9.0)	Treat by injecting a weak acid (acetic acid or white vinegar).
Tannins (humic acid)	Remove using chlorination with a detention tank or a special anion-exchange unit.

Additional Sources of Information

MWPS-14, "Private Water Systems Handbook"

WQ-1341, "Drinking Water Quality: Testing and Interpreting Your Results" *(www.ndsu.edu/waterquality)*

WQ-1352, "What's Wrong With My Water? Choosing the Right Test," *(www.ndsu.edu/waterquality)*

Treatment Systems for Household Water Supplies:

Activated Carbon Filtration, AE-1029
Iron and Manganese Removal, AE-1030
Distillation, AE-1032
Softening, AE-1031
Chlorination, AE-1046
Reverse Osmosis, AE-1047

Common Water Treatment Methods

Below is a brief description of the six most common types of household water treatment. The list explains the main use for the treatment method and also, equally important, the major limitations of the method.

List of Common Home Water Treatment Methods

Treatment Method	Main Use	Restrictions
Water Softening	Reduces water hardness minerals (calcium and magnesium) by replacing them with sodium. Also removes some dissolved iron and manganese.	Can be a problem for people on low-sodium diets. A faucet that provides unsoftened water for drinking should be available in the kitchen.
	Softened water requires less soap or detergent for washing and cleaning.	Periodic backwashing and regeneration of the resin bed using salt brine is required.
	Reduces scale formation in pipes, water heaters and on faucets. Improves cleaning ability of soaps and detergents.	
Oxidative Iron Filtration	Reduces iron and manganese concentrations to levels where they don't stain clothes or plumbing fixtures.	Periodic backwashing required. Periodic recharging with potassium permanganate may be required.
	Prevents odors caused by hydrogen sulfide (rotten-egg smell).	Must be installed upstream from a water softener.
Activated Carbon Filtration	Removes general taste and odor problems including chlorine.	Generally does not remove nitrates, sulfates, bacteria or heavy metals.
	Usually installed at the point of use for drinking and cooking.	Periodic replacement of activated charcoal (usually in canisters) is required for continuous operation.
Reverse Osmosis	Reduces heavy metals, most pesticides and fluoride to acceptable levels.	Does not remove all organic chemicals, such as chloroform. Does not remove 100 percent of most chemicals.
	Used primarily for drinking and cooking.	Uses large amounts of water for flushing.
Distillation	Removal of dissolved minerals, trace amounts of heavy metals and many organic chemicals. Used primarily for drinking and cooking.	Produces bland-tasting water. Requires significant energy; therefore, small-capacity units are used.
Chlorination	Aids in the removal of tannin and high levels of iron and manganese. This also disinfects biologically contaminated water supplies and is used in "shock" treatment of wells and storage tanks.	Not recommended as a continuous practice for the control of bacteria in private water wells. A new, bacteria-free source of water should be found. Additional treatment is required to remove residual chlorine and chlorinated organics.

For more information on this and other topics, see: www.ag.ndsu.edu/ndsuag

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