

Groundwater, the source of water for most Wisconsinites, is never simply a pure combination of hydrogen and oxygen atoms (H₂O). It naturally contains many impurities, reflecting the composition of the soils, sand, gravel and rock through which the water has moved. Groundwater contains 1) dissolved minerals such as iron, calcium, magnesium, bicarbonate, chloride, and sulfate; 2) gases such as carbon dioxide, oxygen, and nitrogen; and 3) dissolved organic compounds. As a result of human activity, groundwater can also contain contaminants such as pesticides, nitrate, and volatile organic chemicals.

For most impurities, typical concentrations are not considered harmful to health, but may be objectionable. Too much iron for instance, can discolor laundry or stain fixtures; too much calcium can cause a buildup of scale in water heaters and plumbing. Improving water quality is more serious if the water contains substances that pose a health concern such as bacteria, viruses, nitrate, metals such as barium or arsenic, pesticides, or volatile organic compounds.

Before buying a treatment system

Have a chemical analysis of your water performed at a state certified laboratory and then ask several dealers for estimates on systems to remove the type and amount of contaminant(s) found in your water. Wisconsin has established a product approval program for home water treatment devices. Be certain that the unit you purchase or lease has been approved by the Wisconsin Department of Safety & Professional Services; if you are not sure, request a copy of the approval letter from the vendor or go to:

Verification.dsps.wi.gov/Industry-Service-Searches/PlumbingContaminants

What to do if you have water quality problems?

The answer to that question depends on whether you're talking about a health-related contaminant or an aesthetic concern. For health-related contaminants, water quality experts recommend seeking a safe source of drinking water before resorting to water treatment. For minor aesthetic (taste, color and odor) problems, water treatment can often be a simple and effective solution.

Water treatment

It is important that homeowners realize that no one water treatment system is capable of treating all water quality problems, and all systems have limitations. Proper care and routine maintenance are critical to ensuring the device continues to work properly. You need to match the treatment system to the specific water quality problem(s) you want to remove. Remember that the claims of manufacturers and dealers may not always accurately describe what the system will do on your water. In addition, some types of systems may require other characteristics of the water to be modified in order for the device to function properly. You can often lease a unit initially to determine whether it performs properly.

Improving Your Water Quality



State of Wisconsin
Dept. of Safety & Professional Services

For more information:
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Diagnosing Your Water Quality

The following is a brief table adapted from a University of Wisconsin Extension Publication. The table lists some of the symptoms, causes and treatment options for some common water quality problems in Wisconsin. The department recommends individuals to seek professional assistance in the diagnosis, treatment, and the maintenance of water treatment devices for health related contaminants. **(*Indicates a contaminant with potential health implications)**

Concern	Symptoms or diagnosing problem	Cause and/or source	Possible water treatment methods	Additional information
Arsenic*	Detecting this problem requires testing.	Naturally occurring arsenic in soil and aquifer minerals.	In some areas new well construction or reconstruction have been successful at reducing arsenic concentrations; otherwise distillation, reverse osmosis, or anion exchange.	The arsenic standard is 0.010 mg/L. Everyone should sample their well for arsenic at least once every five years. If you are in an area where arsenic has been detected, it is recommended that you retest your well each year.
Coliform bacteria*	Change in color, taste or odor; often no symptoms and detecting this problem requires testing. Intestinal illnesses may occur if harmful bacteria like E. coli are also present.	Well construction and/or plumbing defects; wells installed in fractured bedrock that allow bacteria from surface water or wastes to seep into groundwater.	Correct any well construction faults, then follow DNR recommended procedure for disinfection. For recurring bacteria problems it may be necessary to install a new well or reconstruct the existing well. If this fails, chlorination or UV treatment may be used only with prior DNR approval.	A sanitary well should not contain coliform bacteria. The presence of coliform bacteria indicates a pathway for harmful pathogens such as E. coli to enter the well. While coliform bacteria are generally not considered harmful they are an indication of unsanitary conditions that should be investigated and corrected.
Chlorine	Water smells like chlorine.	Byproduct of chlorination.	Activated carbon.	
Cloudiness	Cloudy or gritty water; water pipes, filters and water heater may be plugged.	Fine sand, silt and clay passing through the well screen. Precipitates forming in the water from changes in temperature or pressure.	Repair or replace well screen. Install a physical filter system. Soften the water to prevent precipitation of scale.	Cloudy or gritty water may occur as a result of blasting or construction activities. If cloudy water routinely occurs after rainfall and snowmelt, rock fractures may be allowing rapid water movement of surface water into the well or well may have a leaky casing; also be aware of possible bacterial contamination.
Copper*	Blue green stains on sinks and other bathroom fixtures. Detecting this problem may require testing.	Copper is a common material in household plumbing. Corrosive water that comes in contact with copper pipes will often cause elevated levels of copper in water.	Neutralizing filter if water is corrosive to prevent copper dissolution; reverse osmosis or distillation to reduce copper concentration.	The copper standard is 1.3 mg/L. Because copper levels are generally caused by water sitting in contact with household plumbing, allow water to run for a period of time before drinking. This will often lower concentration to a safe level.
Hardness	Formation of scale, particularly within the water heater; scale deposits on faucets or utensils, soap scum.	Dissolved calcium and magnesium from soil and aquifer minerals containing limestone or dolomite.	Ion exchange (water softener).	Water considered hard when hardness greater than 150 mg/L as CaCO ₃ . Hard water is generally higher in alkalinity and less corrosive than soft water. Scale formation in water heater can decrease water heater efficiency.
Hydrogen Sulfide	Water smells like rotten eggs.	Hydrogen sulfide, a reduced form of sulfur. Source may be naturally occurring if water has passed through organic matter. May also be produced by a sulfate reducing bacteria (see also Iron and/or Sulfur Bacteria).	Oxidation techniques, aeration.	This is the most common odor and is more noticeable in hot water. It causes no harmful health effects at low levels, but may cause air quality problems.
Iron and/or Manganese	Water clear when drawn but red-brown (iron) or black particles (manganese) appear as water stands; red-brown or black stains on fixtures or laundry.	Acidic or reduced groundwater can dissolve naturally occurring iron or manganese from soil or bedrock. Reduced iron and manganese precipitate out of solution when water comes in contact with oxygen.	Water softener (hard water and low iron concentrations); iron filter (<15 mg/L iron + manganese); chemical oxidation or aeration and particle filter (>10 mg/L iron).	Iron is a major aesthetic problem in many parts of the state. The secondary drinking water standards of 0.3 mg/L for iron and 0.05 mg/L manganese are based on aesthetic effects in water.
	Water contains red-brown particles when drawn; particles settle out as water stands.	Oxidized iron/manganese due to exposure of water to air prior to tap; iron particles from corrosion of old pipes or equipment.	Particle filter.	
Nitrate*	Detecting this problem requires testing.	Nitrogen from fertilizers, manure storage, waste spreading, septic systems or the breakdown of organic wastes.	Anion exchange, distillation, reverse osmosis.	Infants less than 6 months of age and women who are pregnant should avoid drinking water that contains more than 10 mg/L of nitrate-nitrogen. The presence of nitrate above 2 mg/L indicates water is being impacted by local land-use and may also indicate other potential contaminants.
Pesticides*	Water smells musty or earthy.	Compounds from decomposition of natural organic matter entering the water supply.	Activated carbon, oxidation	You may suspect this problem if pesticides are used or handled near your water supply.
	Yellowish cast to water after softening and/or filtering.	Tannins are picked up when water passes through soils with high organic matter content or decaying vegetation.	Anion exchange, oxidation	