Water Contaminant Guide

Complaint, Impurity or Contaminant	Symptom	Causes	Means Of Treatment
Hard Water	Soap curd and lime scum in wash basins and bathtub. Whitish scale deposits in pipes, water heater, and tea kettle.	Calcium (limestone) and magnesium salts in raw water measuring 3.0 grains per gallon (as CaCO2) or higher total hardness	All calcium and magnesium salts removed with cation exchange water softener. General limit 100 gpg TH. Where hardness above 70 gpg, install two (2) softeners in (tandem) series.
Grittiness	Abrasive texture to water when washing or residual left in sink and tub.	Excessively fine sand or silt in water passing through well screen or coagulation treatment step.	Install a sand trap or ultra filtration with membrane elements (See step 2 under Turbidity.)
Odor	Abrasive texture to Aromatic, fishy, musty, earthy, or woody smell.	Generally harmless organic matter often found in surface water sources.	(1) Activated carbon media type filter; or (2) cartridge, A.C. filter for drinking and cooking uses.
	Chlorine smell, "city water"	Excessive chlorination in public or private well sources.	(1) Dechlorinate with activated carbon media type filter; or (2) cartridge A.C. filter for drinking and cooking water only.
	Rotten egg odor "sulfur water" and/or tarnished silverware. Yellow, black stains on bathroom fixtures. Discolors coffee, tea, and other beverages as well as distorting appearance and taste of cooked food.	1. Dissolved hydrogen sulfide (H2S) gas in raw water. Often present in high iron content water and low pH waters. 2. Presence of sulfate reducing bacteria in raw water feeding on sulfates in water, creating trace H2S quantities, usually on hot water side. 3. Reaction of magnesium anode rod in hot water heater and soft water. (Electric or gas fired heaters.)	(1) Disinfect all plumbing with household bleach and repeat supply by chlorination to eliminate this rare bacterium. If desired, follow with activated carbon media filter. 1. Remove magnesium rod from heater 2. Use alternate anode such as aluminum
	Detergent odor, water foams when drawn. Septic odor. (See also Nitrate impurity.)	1. Seepage of septic system discharge into underground water supply. 2. Detergent accidentally put in water supply system or well.	1. Locate and eliminate source of seepage, that heavily chlorinate well. 2. Activated carbon media filter will absorb limited amounts detergent.
	Gasoline or oil (hydro-carbon) smell.	Leak in fuel oil tank or gasoline tank allowing seepage into water supply, or aquifer.	No residential treatment. Locate and eliminate seepage. Activated carbon will absorb oil and gasoline (most hydrocarbons) on short-term basis.
	Methane gas smell or cloudy water.	Naturally occurring caused by decaying organics in (a)	Residential/commercial aeration system with proper venting of

		oil well fields, or (b) housing areas built above old city dump sites entering aquifer/well source.	methane and resume water. Note: Methane very volatile gas.
	Phenol smell (chemical odor).	Industrial wastes seeping into surface or ground well supplies.	Activated carbon media filter with absorb short term. Locate and eliminate source or seek new water supply.
Taste	Salty or brackish flavor of water. Laxative effect in some situations	1. High sodium or magnesium content, i.e., NaCl, NaSo4, MgSo4.	1. No economical residential treatment for sodium over 1800 ppm. 2. Deionize drinking water only with disposable mixed bed - anion/cation resins, or; 3. Reverse osmosis for drinking and cooking water only, or; 4. Home distillation system for drinking and cooking water.
		2. Malfunction of water softener leaving brine in water lines.	Open cold-water tap and flush out softener. Service softener to correct problem.
	Alkali taste. Stained aluminum cookware.	High (TDS) dissolved mineral content and high alkalinity in raw water, i.e., So4, CI, HCO3.	1. No economical residential treatment (total compensated hardness over 180 grains per gallon). 2. Reduce TDS to lower limits by RO for cooking and drinking water.
	Metallic taste	1. Very low pH water in the 4.5 - 5.5 range. 2. Heavy iron concentration in water (above 3.0 ppm Fe).	1. Correct with calcite media-type filter (see Acid water). 2. (See Iron Water.)
	Mine water acidity.	pH below 4.5 with mineral acidity.	Chemical feed, soda ash, or caustic.
Corrosion of stainless surfaces	Blackening and pitting of stainless steel sinks and stainless ware in commercial dishwashers. Mud, silt, clay, and sediment in water.	1. Very high chloride (CI) content in water. 2. High temperature drying creates chloride concentration accelerating corrosion.	1. Use other chloride resistant metals. 2. Reduce TDS, including chloride content by partial RO, split stream.
Turbidity	Mud, silt, clay and sediment in water.	Suspended matter in surface water-pond, steam, lake-riled up after a rainstorm.	Calcite media filter-up to 50 ppm, or puma cite media filter.
	Sand, grit, silt, or clay substances.	Well sand from new well or defective well screen coming through system.	Use sand trap and/or install new well screen.
	Rust in water, red discoloration and sediment	Acid water causing iron "pick-up" in water system or caused by repair to water mains	Calcite media filter for correction low pH, and to remove precipitated iron.

	Gray, string-like fiber.	Organic matter in raw water-algae, etc. Usually occurs in surface water sources	Constant chlorination followed by calcite media filter; or activated carbon media filter to dechlorinate
Acid Water	Green stains on sinks and other porcelain bathroom fixtures. Blue-green cast to water.	Water which is high carbon diocode content (pH below 6.8) reacting with brass and copper pipes and fittings	1. Neutralizing calcite media filter down to pH of 5.5; or 2. Filter with mixed media of calcite/magnesia oxide* (5 to 1), for higher flow rate, and to correct very low pH water; or 3. Soda ash chemical feed followed by filtration.
Mine Water	Unable to raise pH with calcite media. Greenish stains and red staining fixtures.	Mineral acids H2SO4 and HCI from mine water getting into surface supply. PH below 4.3 indicates presence of FMA.	Chemical feed, caustic soda, or soda ash.
Corrosive Water with High Oxygen content	Failure of copper tubing and pitting of brass fittings, especially on hot water where pH is near neutral. Some greenish stain may show on plumbing fixtures.	Oxygen corrosion usually found with surface water supplies and in deep well supplies in arid regions. By heating high 0_2 water, the oxygen is set free to attack metal surfaces.	Chemically feed mild amounts of polyphosphates and/or sodium silicates to protect metal surfaces from attach.
Discolored Water Red, "Iron Water"	Brown-red stains on fixtures, dishes and laundry. Water turns brow-red in cooking or upon heating. Clothing becomes discolored when laundered. Iron above 0.3 ppm (Fe) causes staining Usually darkens coffee, tea, and other beverages.	Dissolved iron in influent (more than 0.3 ppm Fe). Water appears clean when first drawn at cold-water faucet.	1. Can remove 0.5 ppm of Fe for every grain/gal. Of hardness up to 10 ppm with water softener and minimum pH of 6.7 (un aerated water). 2. Over 10 ppm Fe: chlorination with sufficient retention tank time for full oxidation followed by filtration and dechlorinaiton. 3. In warm climates (Southeast, Southwest) residential aerator, (re pump) and filtration will substantially reduce iron content. 4. Pressure aeration plus filtration for up to 20 ppm Fe.
	Reddish colored water with red particles setting to bottom of a glass, upon brief standing.	Precipitated iron, water not clear when first drawn at cold water faucet.	1. Up to 10 ppm iron removed by manganese greensand filter; if pH 6.7 or higher; or 2. Manganese treated, aluminum silicate media* catalyst filter where pH of 6.8 or higher and oxygen is 15 percent of total iron content. 3. Down flow water softener with good backwash, up to 1.0 ppm Fe Above 1 ppm, up to 10 ppm use calcite media filer followed by down flow water softener.
		Iron pickup from old pipe when pH below 6.6.	Calcite media filter to remove precipitated iron and raise pH to 7.0 values, or better.

	Brownish cast does not precipitate	Organic (bacterial) iron "crenothrix."	1. Treat well to destroy iron bacteria with solution of hydrochloric acid then constant chlorination followed by activated carbon filtration or calcite filer 2. Potassium permanganate chemical feed followed by MnZ/anthracite filter.
	Reddish color in water sample after standing 24 hours.	Colloidal iron.	Constant chlorination and retention followed by activate carbon media filter dechlorination
Yellow Water	Yellowish cast to water after softening and/or filtering. (Color reading over 75 APHA units.) Yellow stains on washable fabrics, china, and bathroom fixtures.	Tannins (humic acids) in water that are harmless organics from water passing through pestiside soil and decaying vegetation.	1. Absorption via special macro porous Type I anion exchange resin regenerated with salt (NaC) up to 3.0 ppm, or; 2. Chlorination with full retention time followed by filtration/dechlorination (over 3.0 ppm)
Black Cast to Water	Blackish staining of fixtures and laundry. (Manganese content above 0.05 ppm causes stains.)	Interaction of carbon dioxide or organic matter with manganese bearing soils. Usually found in combination with iron.	1. Manganese greensand or manganese treated sodium alumino-sillicate type filter to limit of 6 ppm, 15 ppm respectively (combined Fe and Mn) with pH not lower than 6.7. 2. Manganese treated aluminum silicate media catalyst filter under proper set of conditions.
	Cloudiness of water when drawn.	1. Some precipitant sludge created during heating of water but disappears quickly. 2. High degree of air in water from poorly functioning pump. 3. Excessive coagulant-feed being carried over to potable water through filtration plant.	1. Blow down domestic or commercial hot water heater tank periodically to rid hot water tank of precipitated calcium sludge. 2. Water will usually clear quickly upon standing. 3. Reduce coagulant quantity being fed and service plant filter units on regular basis.
	Cloudy water.	Presence of methane gas (CH4) in water. Common in marsh water when putrefaction takes place in swampland areas. Also common in oil field waters.	Aeration with proper venting of this **volatile gas** and re pump product water. Free methane gas is a fire and explosion hazard.

Problems with Hard water – Scale Build Up

Hard water can contain many magnesium and calcium ions.

The ions dissolve easily in water, and due to cohesion, they tend to stick together. They also tend to bond with other substances, such as copper.

When a few ions bond with such substances, other ions will, in turn, bond with them. These ions can cause problems with metal structures.

The ions build up as deposits inside water pipes and water heaters, eventually clogging the pipes. In many households, calcium or magnesium may build up in cookware, especially in coffee machines and kettles.

The clusters of calcium and magnesium ions forms what could be described as "scale," or, more informally, "buildup." Additionally, when one showers or washes their hands in hot water, the ions react with the soap to form a sticky "scum," which hinders the soap's ability to lather properly.

To alleviate problems with hard water, it can be treated to reduce the calcium and magnesium concentration.

Many ways exist for this; however, for households, most of those are much too expensive. One inexpensive solution is to use a water softener or Reverse Osmosis Water Purification System.

Regulating water distribution

Drinking water is often collected at springs or extracted from artificial borings in the ground, or wells.

Other water sources are the rainwater and river or lake water. This surface water, however, must be **purified for human consumption.**

This may involve removal of undissolved substances, dissolved substances and harmful microbes.

The Best technique that exist,is reverse osmosis.

The distribution of drinking water is done through municipal water systems or as bottled water. Governments in many countries have programs to distribute water to the needy at no charge.

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