

WATER QUALITY FACT SHEET

OCTOBER 2011

Hard Water

What is Hard Water?

Water hardness is normally referred to as a measure of the soap or detergent consuming power of water. Scientifically, hard water is water having a high concentration of calcium and magnesium ions. These, along with other minerals, are commonly present in all natural water. When water that contains any degree of hardness evaporates or is heated in typical household water heating equipment it can leave residual mineral deposits. In the water industry hardness is expressed in terms of milligrams per liter (mg/L) or grains per gallon (gr/gal).

What Makes Water Hard?

Water is referred to as the "universal solvent" because, over the course of time, water will dissolve or erode almost any material that it is in contact with. It is this natural occurrence that attributes to the hardness of water.

As water seeps through the ground (or percolates) into aquifers, it is filtered and purified through the many layers of the earth. At the same time, water may dissolve and retain naturally occurring minerals it comes in contact with. Groundwater is typically characterized by higher levels of dissolved solids, constant cool temperature, and low levels of dissolved oxygen. This is why groundwater (or well water) does not usually need to be treated or filtered. However, groundwater may contain an abundance of the minerals that can contribute to water hardness. Groundwater supplies used by the City of Brentwood produce water with a hardness range of 190 to 490 milligrams per liter.

Water that comes from streams, rivers, and lakes (surface water) is exactly the opposite. Surface water accumulates mainly as a result of direct runoff from rain or snow. It does not percolate through the ground and does not pick up the elevated levels of dissolved minerals that contribute to water hardness. For the most part, surface water is referred to as "naturally soft", although it is not mineral free. In general, turbidity, suspended solids, rapid temperature fluctuations, and high levels of dissolved oxygen characterize surface water. The City of Brentwood's Surface Water Treatment Plant consistently produces water for distribution to residents with a hardness range of 56 to 132 milligrams per liter.

Description	Hardness (mg/L)	Hardness (gr/gal) ⁱ
Extremely soft	0-45	0-2.6
Soft	46-90	2.6-5.2
Moderately hard	91-130	5.2-7.6
Hard	131-170	7.6-10.0
Very hard	171-250	10.0-15.0
Excessively hard	Over 250	Over 15.0

Classification Table

City of Brentwood Public Works/Operations – Water Operations Division

Indications of Hard Water

Hard water interferes with almost every cleaning task from laundering and dishwashing to bathing and personal grooming. Clothes laundered in hard water may look dingy and feel harsh and scratchy. Dishes and glasses may be spotted when dry. Hard water may cause a film on glass shower doors, shower walls, bathtubs, sinks, faucets, etc. Hair washed in hard water may feel sticky and look dull. Water flow may be reduced by deposits in pipes.

Health Concerns

Water hardness is not regulated by the Environmental Protection Agency or the California Department of Public Health because hard water is not a health hazard. However, it is of interest to many consumers.

The effects caused by hardness make many residents consider installing home water filtration devices. The typical equipment used for this purpose is the ion exchange water softener. Softening is accomplished with synthetic resin media by exchanging ions of calcium and magnesium that contribute to hardness with ions of sodium. Although this method of softening can produce water with zero hardness, it is important to understand the limitations of the process. A great resource for consumers considering a water softener or other filtration device can be found at <http://water.epa.gov/drink/info/>.

- Homes that use these devices show elevated levels of lead and copper from the plumbing systems due to the aggressive nature of the softened water.
- Ion exchange softeners increase the sodium content of the treated water and may be potentially harmful to persons that are on sodium-restricted diets. People should limit or restrict the amount of softened water they consume or use for food preparation.
- The softening process removes the chlorine residual from the water and may accelerate bacteria growth within the plumbing system.
- The disposal of spent brine solution and rinse water from softener regeneration is becoming a major problem and can impact wastewater treatment facilities and septic systems. Softener byproducts are corrosive to material they contact and possess varying toxic levels in relationship with the environment.

For More information

For more information or to find out the water hardness in your area call Public Works/Operations at (925) 516-6000 or visit <http://www.brentwoodca.gov/department/pw/operations/water/index.cfm>.

Reference

United States Environmental Protection Agency
<http://water.epa.gov/drink/info>

California Department of Public Health
<http://www.cdph.ca.gov/certlic/drinkingwater/Pages/default.aspx>

ⁱ Grains are determined by dividing milligrams per liter (mg/L) by 17.1.