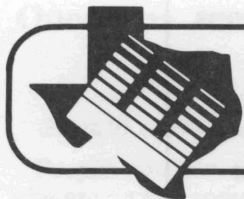


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HARD WATER— To Soften Or Not To Soften



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Minerals which cause hardness in water have a wide impact on households. 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 washed in hard water may be spotted on drying. Hard water may cause a film on glass shower doors, shower walls and bathtubs. Hair washed in hard water may feel sticky and look dull.

Hard water also affects the performance of household appliances. Researchers at New Mexico State University studied the effects of water quality on the performance of gas and electric residential water heaters. The one-year study measured the energy consumption of six gas and electric residential water heaters in use for 5 to 15 years in Las Cruces, New Mexico. Half of each group used the area's untreated hard water exclusively. The other half used softened water exclusively. Results of the study showed that water heaters using only hard water consumed con-

siderably more energy than those using only softened water.

The researchers removed and weighed the sediment and scale accumulated in each of the water heaters. The group using only softened water contained scale buildup weighing from 1.09 pounds to 4.27 pounds. The group using only hard water contained scale buildup weighing from 3.86 pounds to almost 40 pounds.

Accumulated scale is a poor conductor of heat. In water heaters, accumulated scale insulates the water from the heat source. The New Mexico study demonstrated that water heaters with scale buildup used more energy to deliver a given amount of hot water than heaters without scale buildup.

Another study conducted at Ohio State University showed that the use of softened water in certain household tasks lessened the time necessary to complete the tasks, permitted ease of cleaning, and contributed to savings in the amount of household cleaning products used. If these items are important to you, consider softening water in your household.

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Water Quality Research Council's Water Supply Classifications

Soft Water	0 to 1 grains per gallon
Slightly Hard Water	1 to 3½ grains per gallon
Moderately Hard Water	3½ to 7 grains per gallon
Hard Water	7 to 10½ grains per gallon
Very Hard Water	Over 10½ grains per gallon

Measures of Hardness

Calcium and magnesium ions present as sulfates, chlorides, carbonates and bicarbonates cause water to be hard. Water chemists measure water impurities in parts per million (p.p.m.). For understandability, hardness ordinarily is expressed in grains of hardness per gallon of water (g.p.g.). The two systems can be converted mathematically. One grain of hardness is the amount of calcium and magnesium equal in weight to a kernel of wheat. The table shows how the Water Quality Research Council classifies water supplies.

Water supply companies and health departments can tell you how hard the water is in your area.

How To Reduce Hardness

You can reduce water hardness by buying or renting a mechanical water softening tank and connecting it to your water supply line. According to the Water Quality Research Council, all recognized home water softening equipment now on the market operates on the ion exchange principle to remove hardness minerals from water. In this process, the water passes through a bed of softening material, usually sulfonated polystyrene beads, which are microporous. The beads are supersaturated with sodium to cover both their exterior and interior surfaces, thus having the ability to take on or give up electrical charges.

The ion exchange process takes place as the hard water passes through the softening material. The calcium and magnesium attach themselves to the resin beads while the sodium in the resin beads is released simultaneously into the water. The process occurs billions of times during softening. Eventually, so much hardness collects on the softening material that the unit can no longer soften the water and recharging is necessary. Then, the softening material is washed automatically with a brine solution to replace the sodium and enable the ion exchange process to continue.

Types of Water Softener

Mechanical water softeners are classified in four different categories.

1. **Manual:** the owner starts and stops all steps in the recharging of the unit.

2. **Semi-automatic:** the owner starts the steps manually with the exception of the automatic termination of the rinse and the return to service.

3. **Automatic:** the owner stops the unit when recharging is necessary. All subsequent steps in recharging follow automatically.

4. **Fully-automatic:** the unit operates with a timer and all operations are activated automatically. Softening material contained in the system is sufficient for multiple regenerations but must be added periodically as required.

Selecting A Water Softener

Buying a water softener requires comparison shopping and investigation. Here are some hints to assist you as you shop:

- Expect prices to range from about \$400 to more than \$1800. Avoid both extremes. A reasonable price for a quality water softener, installed, is about \$600 to \$800.
- Buy only from a reputable dealer. Be wary of door-to-door sales-people.
- Decide on a system only after you have considered the cost of the equipment and its installation and have obtained an approximation of operating costs. Expensive units are sometimes called "water treatment" systems, but may be only glorified softeners.
- Check the warranty. Be sure you understand it. Warranties may be for only one year or a lifetime. Again, avoid both extremes. A dependable warranty could be for 10 years on the tank and five years on the control valves.
- If installation fees are included in the price, be sure that there are no further charges for bypassing lawn and garden water systems, replenishing swimming pools, etc.
- Be certain that you understand the method and cost of recharging the system.
- Ask dealers for names of customers. Check with these customers to learn if they are satisfied with the equipment and service. Ask friends who have invested in water-softening equipment for advice.

Questions And Answers About Water Softening

Should everyone use softened water?

People who have heart or circulatory problems or who are on low sodium diets may not want to soften water or they may want to soften only hot water. The latter option defeats the purpose of a water softener as operating the dishwasher is the only household task in which hot water alone is used. People with heart or circulatory problems should discuss the question with a physician.

In addition to the sodium, are there any other ways in which softened water may be harmful?

Water contains trace elements or vital minerals found only in minute quantities in the human body. These tiny amounts have a profound effect on human health. Researchers have found conflicting results relating the mineral content of water to the risk of cardiovascular disease. The risk appears to be lowest where the drinking water contains lots of minerals, and highest where the water is soft. Consumers may want to consider installing a bypass to the kitchen water supply for cooking and drinking purposes.

Is softened water harmful to plants, lawns and gardens?

Softened water is not recommended for watering plants, lawns and gardens due to its sodium content. Care must also be taken that water used in recharging a water softener be disposed through a storm drain or sewer due to its damaging effects. If you are on a septic tank, the logical method of brine disposal is to discharge the brine into the septic tank and soil absorption field where some leaching of sodium salts will occur. Other alternatives include a separate holding tank which could be evacuated by a vacuum truck or a separate disposal field or discharge point that does not affect neighbors' property.

Can mechanical water softeners be rented?

Renting water softening equipment may be an option only in urban areas. For a monthly fee, the company installs a softening unit and replaces it periodically with a freshly charged unit. This may be the optimum type of service for small households, households with moderate water usage or households seeking the least possible maintenance of equipment.

Can softened water be used in a steam iron?

The best choice of water for steam irons is distilled water, particularly for use over a long period of time. Softened water is not free of minerals which may clog steam irons.

Should softened water be used in operating an evaporative cooler?

The sodium in softened water will accumulate on evaporative cooler pads. The pads should be cleaned monthly by hosing them with hard water to remove the sodium buildup. Softened water may also be harmful to metal parts in coolers causing excessive accumulation of rust. Bypassing the cooler with a separate water line for hard water is possible, but installation and maintenance costs must be considered.

The advantages of softened water are numerous. You can expect cleaner, softer-feeling clothes, less use of household cleaning products, such as detergents, less use of personal cleanliness products, such as shampoo, and all-around easier maintenance and upkeep of the home. You can also expect longer life of appliances, including washing machines, dishwashers and water heaters.

Whether to soften household water supplies or not, is not a decision to be made lightly. Among factors to consider are family composition, stage in the family life cycle, lifestyle, health, maintenance of the equipment and cost.

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