

City of Hartford Sewer Utility

FREQUENTLY ASKED QUESTIONS ABOUT CHLORIDE

Revised January 26, 2023

What is the issue?

The wastewater discharge permit issued to the City by the Wisconsin Department of Natural Resources includes conditions that protect water quality standards of the Rubicon River. One of those conditions is a weekly average limit of 570 mg/L for “chlorides”/salt with a target concentration of 500 mg/L. The challenge with this is that when chlorides are absorbed by water, they cannot be removed at the wastewater treatment plant. Therefore, we must concentrate on reducing chlorides at their source. Two main factors that influence the chlorides in the water coming to the treatment plant are water softener brine tank regeneration and deicing operations for public and private safety on sidewalks, driveways, roads, and parking lots. The city is constantly trying to reduce the amount of road salt applied on public property with improved equipment and through conscientious application by the drivers of our plowing vehicles. Water softener and salt use at your home or business, on the other hand, is up to you.

Chloride

What is it?

Chloride is one of two components of sodium, also known as table salt or rock salt. When salt dissolves in water, it separates into sodium (Na⁺) ions and Chloride (Cl⁻) ions.

Where does Chloride come from?

Small amounts of Chloride come from soaps, detergents, and other cleaning products. Some also comes from industrial and commercial processes. A significant amount of Chloride comes from self regenerating water softeners.

Our Environment

Why should I care about Chloride?

Our freshwater streams and lakes contain low levels of naturally occurring salts, including chloride. These salts are essential to the aquatic organisms that live there. However, high concentrations of Chloride are harmful to aquatic plants and animals.

How does it get in the Environment?

From the water softener, Chloride is flushed into the sewer where it goes to the wastewater treatment plant. Treatment plants are designed to remove particles, like grit and sand, and to biologically degrade organic waste, such as food and human waste. Once Chloride is dissolved in water it cannot be removed by settling, or biologically degraded by standard treatment processes. Chloride that comes to the City of Hartford treatment plant passes through the plant to the Rubicon River and eventually the Rock River. About 7500 pounds of salt pass through the Hartford plant to the environment each day.

Can treatment plants be modified to remove Chloride?

The technology to remove Chloride is available, but is very costly. It would involve microfiltration and reverse osmosis, which are the same treatment processes used to produce pure water used in laboratories. One community determined that it would cost about twenty cents to add a pound of Chloride at the water softener, and \$5.00 to remove it at the treatment plant. Households can use up to 100 lbs of salt a month in their water softeners.

Is Potassium Chloride a better choice than Sodium Chloride for my water softener?

No. Although it consists of Potassium instead of Sodium, it still contains Chloride. There is no advantage to using Potassium Chloride as your softener salt in the Hartford area. In some of the drier parts of the western U.S., crops are regularly irrigated with treated effluent wastewater. Certain crops are sensitive to sodium,

and in those areas, they are promoting the use of Potassium Chloride over Sodium Chloride.

Hard Water

What makes hard water hard?

Rainwater that falls is “soft”. It does not contain any minerals. As it percolates through the soil, water dissolves minerals which can include calcium and magnesium. Water with substantial amounts of calcium and magnesium is referred to as “hard water”.

How do you measure hardness?

Hardness is measured in terms of grains per gallon (g/gal) or milligrams per liter (mg/l). If you were to evaporate one gallon of water that had a hardness of 5 g/gal, the residue would be the equal to one-5-grain aspirin tablet. Laboratories often record hardness as mg/l or parts per million (ppm). One g/gal hardness is equal to 17.1 mg/l of hardness. In the example above, 5 g/gal equals 85.5 mg/l hardness. Water that is 10g/gal or more is considered very hard.

What is the problem with hard water?

The minerals in hard water can be deposited as scale on pipes and in hot water heaters. They also chemically interact with soaps and detergents and make them less efficient. For example, it takes 50% to 75% less detergent to clean laundry in soft water than hard water.

Why is my water hard?

The hardness of water from the City of Hartford Water Utility is typically between 18 to 22 g/gal. Various minerals that are pumped from the City’s five active wells make our water hard.

Water Softeners

How is water Softened?

Home water softeners have two tanks: a mineral tank that contains resin in the form of small beads, and a brine tank which holds the sodium salt chloride (salt) solution. As water flows through the mineral tank, the hard minerals, magnesium (Mg^{++}) and calcium (Ca^{++}) ions, replace sodium (Na^{+}) ions on the resin. This process is called ion exchange. The water that flows out is considered "soft" because sodium ions do not build up on pipes as lime or interfere with detergents and soaps.

What is the Regeneration Cycle?

Eventually, the resin reaches its limit as to how much calcium and magnesium it can hold. At this point, the resin is flushed with a strong brine solution from the brine tank. Because of its high salt concentration, the brine washes off the calcium and magnesium and replaces them with sodium. The minerals and brine wash go down the drain and into the sewer system. New salt must be added regularly to the brine tank to replace the salt that is used to regenerate the resin. The regeneration cycle can be initiated by a timer or by demand. A timer regulated softener regenerates the resin after a fixed amount of time regardless of how much water is used. A demand initiated regeneration (DIR) softener either tracks the amount of water used or utilizes a hardness sensor to indicate the resin is near capacity and needs to be regenerated. A DIR softener is the more efficient softener in terms of salt and water usage.

What Can I Do?

Check to see how your softener is calibrated. Some softeners are preset for the highest hardness setting at the factory. This setting may be as hard as 30 grains. Reset the hardness to 20 grains.

Soften everything except the kitchen cold and outside faucets. Generally people prefer the taste of hard over soft water, so the kitchen cold can be left unsoftened.

Check the timer. When was it last adjusted? Many of us move into a house or purchase a water softener and never check it again. Children move out or other factors come into play that affects the amount of water we use. If your softener is regulated by a timer, you may be able to increase the interval between regeneration cycles without affecting the water quality. Increase the time by one day and see if there is any affect on dish washing and laundry during the next month. If hard water is coming through near the end of the cycle, it will take more soap to produce the desired amount of sudsing. When you have determined the time period when hardness is breaking through, set the timer back one day.

If you are replacing your old softener, replace it with a softener that regenerates based on a meter or a sensor. The Benefits to you are a substantial cost savings from your salt and water usage reduction, with the added benefit that you are helping to protect our environment right here in the City of Hartford.

For More Information or Questions:

Please Contact the City of Hartford Sewer Utility Director at (262) 673-2423 or via email at ddentice@hartford.wi.gov Hartford area plumbers could also help to answer questions on softeners and water softening.