Onsite Wastewater Treatment Systems
Special Issues Fact Sheet 3
Water Softeners

Description

Home water softeners, which periodically generate a backwash that is high in sodium, magnesium, and calcium concentrations, can affect wastewater treatment processes and the composition and structure of the infiltration field biomat and the underlying soil. However, attempts to predict whether impacts will occur and to estimate their severity are difficult and often inconclusive.

Water softeners remove "hardness" (dissolved calcium and magnesium) through ion exchange processes. Incoming hard water passes through a tank of containing high-capacity ion exchange resin beads supersaturated with sodium. The calcium and magnesium ions in the water attach to the resin beads, replacing the sodium, which is released into the water. The softened water is then distributed for use throughout the house.

Over time, the ion exchange resin beads become saturated with calcium and magnesium ions. When this occurs, the tank must be recharged by flushing with a salt brine solution. Sodium ions reclaim their position on the resin beads, and the calcium and magnesium ions are released into the backwash water. The backwash water then exits the tank and is discharged to the wastewater treatment system. The number of times the tank is recharged and the amount of wastewater generated depends on a number of factors, including the hardness of the water, the amount of water used, the size of the water softener, and the capacity of the resins to remove calcium and magnesium.

The wastewater generated during the recharge phase of the water softening process mixes with other household wastewaters, enters the septic tank, and eventually moves to the soil adsorption field. Studies conducted by soil scientists at the University of Wisconsin and the National Sanitation Foundation conclude that the wastewater effluent generated from properly operating and maintained water softeners will not harm onsite systems that are designed, operated, and maintained appropriately. Specifically, the studies conclude the following:

• High concentrations of calcium and manganese in the softener backwash water have no deleterious effect on the biological functions occurring in the septic tank and may, in some cases, be helpful.
• The additional volume of wastewater generated (typically about 50 gallons per recharge cycle) is added slowly to the wastewater stream and does not cause any hydraulic overload problems.
• Soil structure in the soil absorption field is positively affected by the calcium and mangnesium ions in water softener effluent (Corey et al., 1977).

Regarding the last conclusion, some people have the misconception that the salt brine that enters the ion exchange tank also exits the tank as wastewater. In fact, the influent with its high concentration of sodium ions is very different than the effluent, which has a high concentration of calcium and magnesium ions. Consequently, the potential for chemical clogging of clayey soil by sodium ions is reduced. The calcium and magnesium input may even help improve soil percolation.

Risk management issues

The human health impacts of ingesting softened water are increasingly discussed in addition to the traditional benefits of reduced use of surfactants and plumbing repair requirements. The choice of the homeowner to soften or not to soften will

factor into all arguments. Also, the preceding descriptions are predicated on whole-house-supply softening. Today point-of-use devices designed for use with specific features in the house make the traditional advantages and disadvantages less clear.

References

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