

Potassium Chloride: The Softener Alternative

Sales claim an increasing market share.

By Constance Stewart

Water softening by ion exchange is a mature industry. For more than 60 years, this technology has brought "the soft life" to millions of North American families. For all but the last 10 of those years, sodium chloride (NaCl), or regular salt, has exclusively been used as the regenerant in water softeners. However, there has been a slow but steady growth in the use of potassium chloride (KCl), which is chemically related to salt and has the same water-softening characteristics. It is also widely used throughout the agricultural industry.

Potassium is an essential plant nutrient which helps regulate the overall quality and health of crops. Potassium chloride is a naturally occurring mineral, often found near large deposits of salt. Virtually all KCl mined in North America comes from Saskatchewan, Canada, where processing facilities produce more than 10 million tons per year, most of which is marketed as agricultural plant food. Most water softeners remove hardness (calcium and magnesium) and iron from water through an ion-exchange process. With salt pellets in the softener, hardness and iron are held in the resin and sodium is released to the softened water. The harder the water, the more sodium is added to effect softening. **Also, native sodium may be naturally present, increasing the total amount of salt found in softened water.**

Using potassium chloride pellets will not release any additional sodium into the water during the ion-exchange process, and native sodium may actually be reduced. No adjustments to the softening equipment are necessary. However, in areas where native sodium is a problem, the capacity of the water softener should be increased to take into account the removal of hardness, iron and native sodium.

According to medical studies, the human body needs both salt and potassium for good health and avoidance of high blood pressure and other serious conditions. The key is balance.

Based on a recommended daily intake of two liters of water, a person would ingest approximately 252 milligrams (mg), or 126 milligrams per liter (mg/l), of sodium in water that was originally 16 grains hard and softened with NaCl as the regenerant. That represents nearly 13 percent of the recommended daily adult sodium dietary level of 2,000 mg. U.S. drinking water standards require less than 20 mg of sodium per liter for people on restricted diets, which represents 10 percent of the population.

In contrast, the same water, softened by KCl would add no sodium to a person's daily diet, and the individual would receive a dietary bonus of potassium in the amount of 427 mg, or 22 percent of the minimum recommended daily requirement of 1,950 mg of adult dietary potassium. Other dietary sources of potassium include bananas, oranges, lettuce, beans, peas and fresh vegetables. A study from the University of Mississippi states that consuming foods rich in potassium helps keep blood vessels healthy through protection against hardening of the arteries.

KCl and the Environment

Because potassium is a primary plant nutrient, its potential for softening water is beneficial when looking at disposal options for waste brine.

One good example is where the sewage sludge or effluent from a facility are being used for fertilization and/or irrigation of agricultural land. Both sewage sludge and effluent are deficient in potassium. Where sewage effluent is being used for irrigation of crops or lawns, excessive sodium buildup in the soil is of concern to farmers and environmentalists.

Today, softeners are being targeted as one of the major sources of sodium and chlorides to the effluent. **Using KCl as a regenerant reduces the amount of sodium present in the effluent, replacing it with potassium. KCl is less damaging to the soils and less mobile than sodium, especially in high-clay soils. Potassium is absorbed by plants and reduces the potential for migration into ground water.**

The use of potassium chloride as a regenerant will also result in a reduction of 12 to 20 percent in total chlorides being discharged to septic or sewage systems.

Governmental and environmental concerns over brine solution disposal have spread nationwide. The City of Santa Barbara, CA recently recommended in writing KCl to water softener owners. Dealers who sell potassium chloride pellets report that the environmental benefits are becoming more important to consumers, although the sodium-free aspect continues to be of primary importance.