By Jerry Poe, IMC Salt Co.

Tons of Choices

The real story on regenerant selection

This article highlights the differences between the various sources and forms of regenerants, what they do and reasons to select each.

Rock Salt

Conventional rock salt is the simplest and, generally, the cheapest form of water softener regenerant available. As rock salt is naturally occurring, processing consists of crushing and screening to desired particle size. The adage, "What you see is what you get," certainly applies to rock salt. Except where it is geographically unfavorable, it is the least expensive form of salt available.

The main disadvantage to rock salt is with no refining of the product, the impurities content is higher. The significance of higher impurities is the need of more frequent clean out of brine tanks due to residue build up. It is not uncommon to go from an annual or longer clean out with evaporated salt to bimonthly clean out with rock salt. Although less expensive, the higher level of insoluble matter tends to necessitate more owner involvement.

An alternative to conventional rock salt is **optically sorted rock salt.** This type of salt has less insoluble matter and does not require clean out as frequently. Although somewhat regional in availability, optically sorted rock salt should be considered a substantially improved regenerant. Typically, the level of insoluble matter is ¼ to ⅛ of conventional rock salt. This increases the time between clean outs of the brine tank and reduces owner involvement.

Solar Salt

Solar salt is another type of regenerant used in water softeners. Solar salt is crystallized from water containing salt, commonly called brines. Examples of weak brines are seawater and the Great Salt Lake. As the sun removes the water from the brine, the salt concentrates until it crystallizes from the brine. During the process of concentrating and crystallization of salt from the brine, a regenerant that is cleaner and purer than rock salt is formed. However, as the brine is concentrated outside, wind blown matter and natural occurring contaminants from the lake can be found in solar salt at low levels. Although the need for cleaning the brine tank is less, there still is more residue found than in evaporated salt. As expected, the cost of solar salt generally falls between rock and evaporated salt in price.

Solar salt comes in two major forms; the first form is **extra coarse solar salt.** Extra coarse solar salt is formed when salt crystallizes from brine as discussed above. The size of the particles greatly depends on evaporation rate; faster evaporation from hot and sunny days generally produces larger salt crystals. Larger crystals allow more water to circulate through the salt in the brine tank and make brine more quickly. Although large granules are aesthetically pleasing, in most softener applications, a medium-sized granule of salt will perform just as effectively. Very small crystals tend to restrict the flow of brine through the salt in the softener and restrict the amount of brine generated.

The lack of flow through the salt is the main reason that granulated evaporated salt is not used in water softeners.

The second form of solar salt is **compacted solar salt.** This salt takes the form of cubes and pellets. The purpose of compaction is to create a product that is larger and more uniform in size than the extra coarse solar salt. Compacted solar salt generally is viewed as a better product than the extra coarse as it has a larger size and a more consistent shape.

Evaporated Salt

Another form of regenerant is evaporated salt. The most common process to form evaporated salt is using a process known as solution mining. Solution mining occurs when water is injected into an underground salt deposit, the water dissolves salt from the deposit and leaves most of the impurities in the deposit. The water and salt form a saturated brine, which is pumped to the surface and concentrated in evaporators that use steam heat to remove moisture and crystallize salt crystals. The mechanical portion of making the salt crystal again is crystallization. The effect of crystallizing salt from brine inside an evaporator allows for a crystal that is not exposed to contaminants and is cleaner and purer than other forms of salt. This is the reason that evaporated salt is the preferred form of water conditioning salt. Evaporated salt is formed in small crystals like those in a salt shaker, which are too small to allow moisture to transport between the crystals and generate brine for a water softener. For this reason, evaporated water conditioning salts are sold as compacted products.

The most common forms of compacted salt are cubes and pellets. These two forms are functionally very similar. Both shapes allow transport of water in the brine tank through the salt for quick brine formation. Consumer preference is one of the main reasons for both shapes. Retail consumers tend to prefer pellets, while most non-retail customers like the cubes. Both shapes have been successful in all sizes and shapes of water softeners.

Potassium Chloride

One of the newer entrants on the scene is potassium chloride. Solution mining, as listed above for evaporated salt, produces potassium chloride that is used in water softening. Mined potassium chloride also exists but currently is not used in the water softening industry. Potassium chloride is a product that is useful for people that, for health or environmental reasons, wish to avoid the use of salt in their softeners. The use of potassium chloride not only does not add sodium to your water, but a softener regenerated with potassium chloride also will remove up to 99 percent of the naturally occurring sodium from the water that it softens. The current forms of potassium chloride are all compacted for the same reasons as salt. The original size is very small and does not allow for good exchange of water through the regenerant. Again, this is a clean product that should be maintenance free in normal usage, much like salt.

Every year, literally millions of tons of water conditioner regenerants are produced and sold in North America. But as the title of this article says, there are tons of options that can affect the best choice of which softener regenerant is best for you and your customers.

About the Author
Jerry Poe is technical director for IMC Salt Co. He oversees technical effort for three plants in Canada, three in the United States, one in England and one mine in each of these countries. In addition, he oversees market and sales support and new product development.

For more information on this subject, write in 1014 on the reader service card.

How Does A Water Softener Work?

A water softener works on the principal of ion exchange. This is a process where positive electrically charged atoms of hardness minerals in water such as calcium and magnesium are exchanged for sodium or potassium ions supplied by the salt. The exchange occurs when water passes over the surface of divinylbenzene resin beads in the water softener. As the water passes over the surface, the resin bead substitutes sodium or potassium for the calcium or magnesium attached to the bicarbonate in the hard water. Sodium or potassium bicarbonates do not contribute to the hardness of the water, hence the water is considered soft.