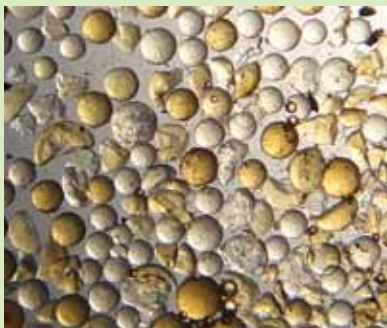
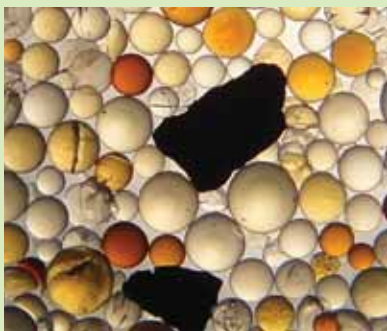


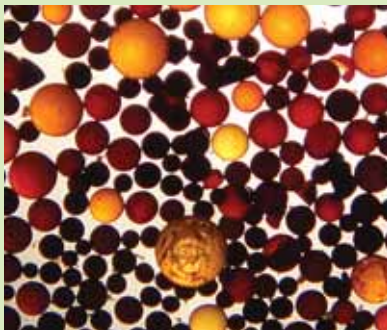
Cation resin with iron fouling



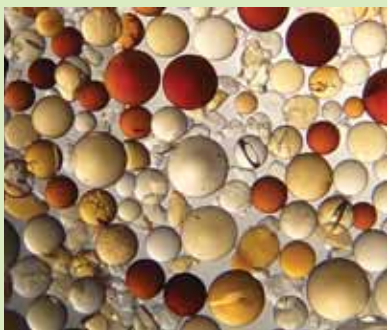
Two types of cation resin with broken beads



A mixed resin bed with broken beads



Cation resin with dark iron fouling



A mixed resin bed with broken beads



Cation resin with iron fouling

Photos courtesy of ResinTech Inc.

Extending Resin Life

Cleaning options to reduce resin fouling

By Justin Ramsey

Water softener resin is extremely porous, which is beneficial because it allows for more surface area to capture calcium and other metals in source water. Surprisingly, 99% of ion exchange actually happens in the interior of the bead. Resin beads, ranging in size from 16 to 50 mesh, are abused daily during the backwash process and by contaminants in the source water. Resin could last much longer in these hostile environments with a few fairly inexpensive solutions.

Resin Basics

Resin is designed to change the chemical makeup of minerals, which makes them cling to the resin beads. In the exchange, the resin bead loses sodium and/or potassium ions. Just before the resin becomes completely saturated with calcium or magnesium, the unit should be set to regenerate. This allows a sodium-rich brine solution (or potassium permanganate for greensand applications) to rinse away the minerals stuck to the resin beads and restore them to peak efficiency—at least in theory.

Resin Killers

Resin life varies based on several factors, such as the type of resin used, the minerals or oxidants present in the source water and the regeneration cycle. Some resin manufacturers see gel-type, 8% softening resin life as a 10- to 15-year event. Because cation resin is essentially porous plastic beads, it is highly susceptible to chloramines and chlorine degradation. The presence of 2-ppm residual

chlorine in a water system can cut the life expectancy of a standard softening resin in half.

Chlorine and chloramines attack the divinylbenzene (DVB) in resin, which causes it to swell and take on moisture. DVB is the ingredient in resin that gives it a hard, porous shape. As DVB breaks down, the pores and channels inside the beads break down and close up. The results include pressure loss and resin that is so mushy it can be crushed easily between two fingers.

Over-brining and fast rinses with freshwater also can cause resin to foul. In situations in which the brine has more than 45% salinity, water is drawn out of the bead due to osmosis and the bead shrinks. In a fast-rinse scenario, water enters the beads at such a quick pace that it causes them to swell and crack. As the beads break down into smaller sizes, they are flushed more easily down the drain during regeneration. Most newer models only allow for slow-rinse cycles to prevent this from occurring.

Resin Foulers

Organic fouling is the most common and expensive form of resin fouling and degradation. Well water is typically low in organic materials, but surface waters contain hundreds of parts per million of natural and manmade organic matter.

Natural organics are formed from decaying materials and are usually acidic and have an odor. The most typical natural contaminants include tannins, oils, tannic acid and fulvic acid. These contaminants plug the interiors of beads, causing a fish eye effect. If these organics remain on the

resin, they break down the strong base of the beads until they are no longer active. At this stage, cleaning the resin can return some of the lost capacity, but the ability to remove silica and carbonic acid will be lost.

In situations in which iron or manganese is present, organic fouling is accelerated. Ferrous iron exchanges ions and attaches itself to resin the same way as hardness minerals. However, a brine solution alone will not dislodge iron ions from resin beads. The iron is oxidized as air is introduced into the system, and the now-ferric iron attaches itself to the surface of the bead as well. The beads will stick to one another, causing channeling. This restricts the flow of water over the resin to specific arteries that form over time in the resin tank, reducing the exchange capacity of the tank to as low as 10%. Manganese fouls resin in the same manner as iron.

Resin Cleaning

With municipal and occasionally well water supplies relying on chlorine for microbial control, a carbon filter is highly recommended ahead of a water softener. With levels of 2 ppm of residual chlorine or chloramines, the resin life will double with a prefiltration system. This process also will help reduce the amount of organic compounds introduced into the brine tank.

Resin cleaning will prevent the buildup of organic compounds and even can clear built-up iron from the pores of beads. There are several methods and products available for continuous resin cleaning. One option is powder cleaners, such as

“Resin cleaning will prevent the buildup of organic contaminants and even can clear built-up iron.”

Pro Products' Softener Mate or Ban T, which are designed specifically to clean oils and organic compounds. Powder cleaners can be layered in between each bag of salt or poured directly down the brine well to treat extremely fouled resin.

There are also multiple liquid resin cleaners on the market, such as Pro Products' Pro Res Care or Res Up, which can be used in an automatic feeder system to deliver precise amounts of cleaning solution to rid resin of organic compounds and limited amounts of iron. Both liquid and powder resin cleaners eliminate the fish eye effect on beads, clearing out the porous surfaces so they can again be used to soften water.

High-iron resin cleaning requires more strength to change the chemical property of the iron. Cleaning products such as Pro Products' Pro Rust Out are formulated to strip iron from the resin beads and eliminate channeling. In situations in which iron levels are more than 2 ppm, the cleaner can be layered between each bag of salt or poured down the brine well to treat extremely fouled resin. Because an iron-fouled unit can have a reduced capacity of up to 90%, using a high-iron resin cleaner can greatly extend the life of resin and save on salt and water costs. *wqp*

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