



DOWEX Ion Exchange Resins

Preventing Silica Fouling of Weak Base Anion Resins

Occasionally, some plants experience weak base anion resin which clumps together due to silica polymerization. Common operating symptoms include short run length and high WBA conductivity during the run (due to channeling), and the inability to backwash the bed. When the vessel is opened and samples are taken, the resin beads will be clumped together and a gummy substance may even be present. This document is an explanation of the most probable cause, and ideas on how to correct the problem.

Most demineralizers which use weak base anion resins for water treatment also use strong base anion resins. In order to minimize the amount of caustic used to regenerate the resins, a technique known as thoroughfare regeneration is generally used. Thoroughfare regeneration is the use of waste caustic from the SBA vessel to regenerate the WBA resin. Since WBA resins regenerate very efficiently, even waste caustic will return the resin to the free base form.

The primary concern with a thoroughfare regeneration is ensuring that most of the impurities from the SBA resin are dumped to the drain before the thoroughfare begins. Generally, the first third of the regenerant from the SBA is dumped to the drain. If significant amounts of silica are present when the thoroughfare begins, it will polymerize upon contacting the acidic WBA resin, leading to the problems described above.

First, the problem needs to be corrected. A variety of changes in SBA operating conditions may have caused the silica peak to shift, including changes in caustic concentration, regenerant temperature, or installation of new SBA resin. Correcting the situation is usually accomplished by dumping additional caustic to the drain before the thoroughfare begins. To be confident that the right amount is dumped, an elution study can be performed.

Layered bed configurations with SBA and WBA in the same vessel generally operate with lower caustic concentrations and more uniform flow rates and so they tend to be less prone to silica precipitation.

Finally, the weak base resin needs to be cleaned. A series of hot caustic soaks should remove most of the polymerized silica and allow continued operation. In some extreme cases, the weak base resin may need to be replaced.

Note that WBA clumping can also be caused by organics build-up on the resin or a combination of organics and silica.

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Warning: Oxidizing agents such as nitric acid attack organic ion exchange resins under certain conditions. This could lead to anything from slight resin degradation to a violent exothermic reaction (explosion). Before using strong oxidizing agents, consult sources knowledgeable in handling such materials.

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