



DOWEX™ Ion Exchange Resins

Preventing Silica Fouling of Weak Base Anion Resins

Silica Fouling

Occasionally, some plants experience weak base anion resin which clumps together due to silica polymerization. Common operating symptoms include short run length, increased pressure drop and high WBA effluent 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 that 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. If significant amounts of silica are present when the thoroughfare begins, it may polymerize upon contacting the acidic WBA resin, leading to the problems described above.

First, the problem needs to be corrected. Generally, the first third of the regenerant from the SBA vessel is discarded to the drain. A variety of changes in SBA operating conditions may have caused the silica peak to shift, including changes in caustic concentration, caustic temperature, or installation of new SBA resin. Correcting the situation is usually accomplished by discarding additional caustic to the drain before the thoroughfare regeneration begins. To be confident that the right amount is discarded, an elution study can be performed. Using a two step caustic injection, for example 2% and 4% NaOH, gives another alternative to dilute the silica peak.

Layered bed configurations with SBA and WBA resins 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 anion 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 anion resin may need to be replaced.

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

DOWEX™ Ion Exchange Resins
For more information about DOWEX
resins, call the Dow Liquid Separations
business:

North America: 1-800-447-4369
Latin America: (+55) 11-5188-9222
Europe: (+32) 3-450-2240
Pacific: +60 3 7958 3392
Japan: +813 5460 2100
China: +86 21 2301 9000

<http://www.dowex.com>

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.

Notice: No freedom from any patent owned by Seller or others is to be inferred. Because use conditions and applicable laws may differ from one location to another and may change with time, Customer is responsible for determining whether products and the information in this document are appropriate for Customer's use and for ensuring that Customer's workplace and disposal practices are in compliance with applicable laws and other governmental enactments. Seller assumes no obligation or liability for the information in this document. NO WARRANTIES ARE GIVEN; ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.

