DOWEX™ Ion Exchange Resins

Procedure for Calcium Contamination of an Anion Resin

Procedure

Calcium fouling can occur on anion resins if raw filtered water is used as the dilution source for the NaOH regenerant instead of decationized, softened or deionized water. If calcium and magnesium are present in the NaOH, then they are likely to precipitate with the bicarbonates/carbonates that are being driven off of the exchange sites. The result is Ca and Mg leakage and extremely prolonged rinse times, which render the ion exchange process inoperable.

Calcium can also be deposited during brine cleaning of anion resins in mixed beds (especially for primary working mixed beds) when a NaCl/NaOH mixture is introduced to remove organic fouling. If the cation component of the mixed bed is not regenerated prior to the brine treatment, the formation of calcium and magnesium hydroxides can occur because the alkaline brine mixture is often prepared by introducing NaOH to the mixed bed vessel and adding salt pellets via the top manway. It is, therefore, critical to FIRST REGENERATE THE CATION RESIN.

Calcium hydroxide can also precipitate on the anion resin surface when an anion resin treats permeated water which will contain traces of calcium. Over time, calcium hydroxide will accumulate and will impair anion resin performance. The effect will be similar to the above case with high calcium leakage and prolonged rinses.

The resin should be backwashed first or treated with NaCl solution when organic fouling is suspected, in order to ensure a good contact with the Ca cleaning solution. To avoid silica precipitation/polymerization, if the resin was highly loaded with silica during the cycle, it should first be regenerated.

If only downflow injection is possible, backwash the bed to loosen and clean it prior to the treatment and then lower the water level down to 10 cm above the resin level.

The detailed cleaning steps have to be adapted to each regeneration process (coflow, different types of counterflows).

Used, mechanically weak resins, may suffer from large osmotic (fast swell/shrink) and mechanical (air scrubbing) strains. It is advisable to use gradual changes in solution concentrations and to minimize the mechanical stress.

The acid concentration should be increased gradually to avoid excessive osmotic stress to the resin.

Procedure (cont.)

The recommended procedure is as follows:

1. Exhaust the anion resin.
2. If possible, air scrub and then backwash the bed to loosen and clean it prior to the treatment.
3. Pass upflow 1 bed volume of a 2% HCl solution at a contact time of 30 minutes.
4. Pass upflow 1 bed volume of a 10% HCl solution.
5. Leave to soak for 4-16 hours with occasional air injection to facilitate contacting of the acid with the resin.
6. Displace/rinse the acid downflow with a minimum of 5 bed volumes DI water.
7. Backwash the resin and then carry out a double regeneration (same caustic concentration at double the injection time).

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