



DOWEX Ion Exchange Resins

Regenerating Strong Acid Cation Resins with Sulfuric Acid

Sulfuric acid is commonly used to regenerate strong acid cation resins. However, when the feedwater contains a significant concentration of calcium salts, there is a potential for exceeding the solubility of calcium sulfate during regeneration. This will result in calcium sulfate crystals being deposited within the resin structure and throughout the resin bed. In order to control the precipitation of calcium sulfate, regeneration with reduced concentrations of sulfuric acid at selected flow rates is necessary.

Regeneration with sulfuric acid is most effectively accomplished by gradually increasing the regenerant concentration, either step-wise or continuously. Table 1 outlines a suggested method of application which gives optimum contact time while still preventing calcium sulfate precipitation. If the percentage of calcium relative to total cations is greater than 75%, the first portion of acid should be applied at a concentration in the range of 0.5-1.0%.

Table 1.

Total Dose H ₂ SO ₄ lb/ft ³ (gm/l)	Step 1 @ 2% lbs (gms)	Step 2 @ 4% lbs (gms)	Step 3 @ 6% lbs (gms)	Step 4 @ 8% lbs (gms)
4 (64)	2 (32)	2 (32)	-	-
6 (96)	2 (32)	2 (32)	2 (32)	-
8 (128)	2 (32)	2 (32)	2 (32)	2 (32)
10 (160)	2 (32)	2 (32)	3 (48)	3 (48)
12 (192)	2 (32)	2 (32)	4 (64)	4 (64)

The recommended regeneration flow rate is also increased in systems operating on high calcium feedwater when regenerating with sulfuric acid. The suggested flow rates for these systems are provided in Table 2.

Table 2.

% Calcium of Total Cations as CaCO ₃	Regeneration Flow Rate gpm/ft ³ (l/hr/l)	
0-25	0.5	4
26-50	1.0	8
51-75	1.5	12
>75	2.0	16

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LENNTECH

info@lenntech.com Tel. +31-152-610-900

www.lenntech.com Fax. +31-152-616-289

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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