

Continuous Ion Exchange for the Purification of Ascorbic Acid

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Ion Exchange and chromatography are common techniques in the recovery and purification of valuable products, such as antibiotics and vitamins.

The state-of-the-art production processes normally involve ion exchange (IX) conversions of an intermediate, keto-gluconic acid (KGA), and of the final product, ascorbic acid, from their sodium salts to the acid forms. These acidifications are carried out on a strong acid cation (SAC) exchange resin in hydrogen form.

In many modern vitamin C manufacturing plants, these steps are implemented in a continuous countercurrent system, thereby saving significant amounts of chemicals and water. Simultaneously, the product concentration is significantly higher, which enables a more efficient crystallization process downstream of the ion exchange process. The specific volumetric throughput for a multicolumn continuous ion exchange process is 2 – 10 times higher than the batch process. As a result, the overall amount of ion exchange resin in a continuous system can be 50% – 80% lower.

In this case presentation, we will describe the design of continuous ion exchange processes based on carousel type multicolumn chromatography/IX systems for both process steps. The case study will include experimental data derived from laboratory scale column tests and small-scale verification of the process design in a laboratory scale multicolumn chromatography system. The process has been scaled up from 4 L to 80 m³ resin volume in each of the two systems.