

ISEP® SYSTEM

Continuous Ion Exchange Separations

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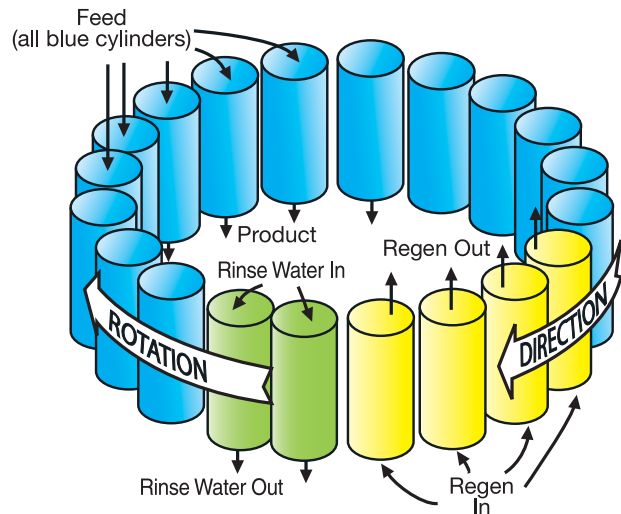
Calgon Carbon's Engineered Solutions group has patented the ISEP® Continuous Separator to perform ion exchange separations using countercurrent processing. The ISEP® and CSEP® (chromatographic separator) systems are currently used at over 300 installations worldwide in more than 40 applications including GMP processes.

The ISEP® Continuous Separator system features a turntable supporting 20 to 30 resin chambers. The turntable rotates at a constant speed and moves the resin chambers with it as they cycle continuously through the various separation phases. The ISEP® system directs the fluids through the resin chambers and delivers product continuously.

Conventional ion exchange fixed bed adsorption systems are usually employed in processes that require the removal of dilute concentrations of chemical species. The low concentrations permit beds of practical size to remain in service for relatively long periods of time, typically 4 to 24 hours. The major disadvantages of fixed bed resin systems are the inefficient utilization of sorbent, their high volume consumption of chemicals, and their limited applicability due to the constraint of low feed concentration.

The ISEP® Continuous Separator provides a new dimension in design flexibility that addresses some of the more serious disadvantages of fixed bed industrial separators.

ISEP® Illustration



ISEP® Design Features

- Reduced Resin Inventory
- Reduced Regeneration Chemicals
- Configuration Flexibility
- Simplified Control Philosophy
- Steady State Operation

DESIGN FEATURES

Reduced Resin Inventory

Sorbent inventory reductions of 30% to 90% are possible due to minimization of idle resin. The use of short resin beds allow for maximum resin utilization. None of the resin sits idle in the cells since it is moved into regeneration as soon as it is exhausted, and it is moved into adsorption as soon as it is regenerated.

Reduced Regeneration Chemicals

Regenerant/resin volume ratios of <1 are achieved by way of countercurrent flow through short sorbent beds. This leads to higher spent regenerant concentrations and smaller effluent volumes. Countercurrent regenerant and rinse water flows with low-volume resin cells combine to reduce the amount of chemicals and dilution required to regenerate and clean the resin.

Configuration Flexibility

The ISEP® system allows for a number of unit functions to be simultaneously achieved within a dynamic process stream under continuous operating conditions. Complex processes requiring multiple eluent and regeneration streams are easily accomplished with the ISEP® system.

Simplified Control Philosophy

The ISEP® valve eliminates all complex sequencing of high maintenance on/off valves. This feature reduces valve maintenance and makes the system easy to operate.

Steady State Operation

There is no interruption of feed or regenerant stream flows, and effluent streams are consistent in composition.

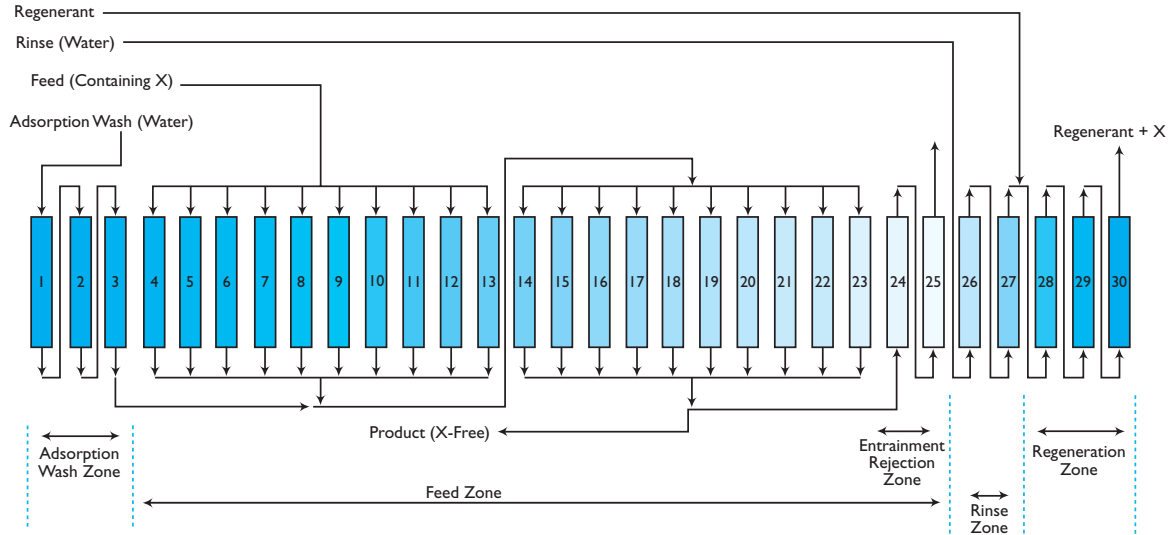
Equipment and Systems

Visit our website at www.calgoncarbon.com, or call 800-422-7266 to learn more about our complete range of products and services, and obtain local contact information.

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Continuous Ion Exchange Example - with Parallel and Series Feed



1. Adsorption Wash Zone

Wash water is injected into three resin beds in series to recover feed and product and is combined with outlet of first pass and fed to second pass.

2. Feed Zone

Feed containing the ions to be removed feeds 10 ion exchange beds in parallel followed by a second pass with 10 additional beds. This arrangement allows high flow rates with extended contact time. The countercurrent, double pass configuration provides high product quality.

3. Entrainment Rejection Zone

Product is collected after the second pass minus undesirable ion. A portion of the product is fed into the entrainment rejection zone to displace rinse water and reduce dilution.

4. Rinse Zone

Rinse water is injected to rinse chemical regenerant from resin. Two resin beds in series are used in this zone.

5. Regeneration Zone

Chemical regenerant is fed into three resin beds in series. This allows maximum chemical utilization and excellent resin regeneration.

Visit our website at www.calgoncarbon.com



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