

SepTor technology



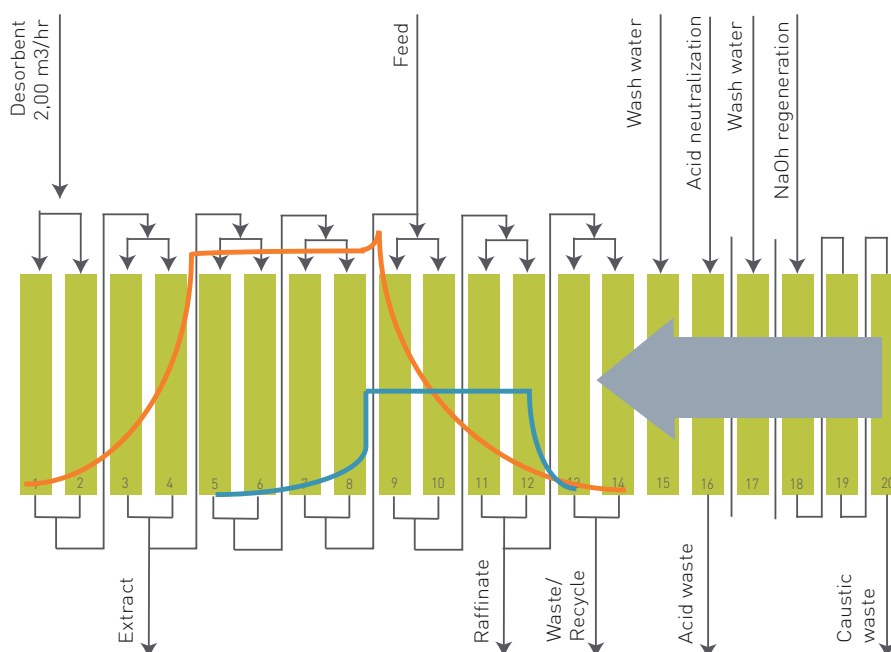
Continuous counter current ion exchange and adsorption

Adsorption and ion exchange are well-established techniques for removing contaminants from water or for the recovery of valuable products from aqueous streams.

The most common system for adsorption and ion exchange is the fixed bed process in which the adsorbent is being held in a stationary column.

The principle of continuous counter current adsorption is best explained by evaluating the adsorption process in a fixed bed.

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Example: Aminoglycoside antibiotic recovery.

Adsorption process

The adsorption process can be described as follows: When a feed solution (φL) is being fed to a fixed bed vessel containing a resin, an adsorption or ion exchange reaction will take place.

During a continuous application of feed solution to the vessel, the adsorption or separation process moves as a front from the top to the bottom of the resin bed in the stationary vessel. This front that gradually moves through the bed is called the Mass Transfer Zone or active zone (MTZ).

For any set of parameters such as the velocity of the feed flow, the particle size of the adsorbent, viscosity of the feed, temperature etc, this front or zone has a certain length, i.e. the "Mass Transfer Zone Length" (MTZL). This MTZL usually comprises a very small part only of the total length of the fixed bed vessel (the total resin bed length)

While the MTZ is gradually moving through the resin bed, it becomes evident that it is only a small portion of the total resin bed, which is active in the working zone. Thus one remaining big portions of the resin bed is exhausted resin (the adsorbent in the top part of the vessel is in equilibrium with the process fluid).

The other part, which is not yet exposed to the active ingredient in the feed solution, is fresh resin. Both of these remaining resin portions are sitting idle and here no activities are taking place.

It is obvious that the actual separation process only takes place in a small part of the columns resin volume.

When the MTZ has reached the exit of the adsorbent bed, the bed becomes saturated and needs to be washed and regenerated before it can be put in an adsorption operation again.

Since the washing and regeneration process consumes a certain amount of time, the continuous processing in a fixed bed will require a total of at least 2 to 3 beds.

Compared to the abovementioned fixed bed process, continuous counter current adsorption aims to freeze the MTZ in the adsorption- and elution sections.

This is executed by physically rotating the adsorbent in small columns counter current in the opposite direction of the process fluids.

This approach ensures optimal adsorbent utilization and leads to a far more efficient, compact and economical separation process as compared to a

SepTor advantages

- Substantial reduction in sorbent inventory, up to 80%
- Improvement in product yield, product concentration and product purity
- Reduction of eluents, chemicals and total water consumption, up to 50%.
- Reduction of wastes (less volume to waste water plant)
- Suspended solids handling
- Small footprint
- Reduced operating cost, capital cost
- Simple operation and control

fixed column system.

The SepTor system comprises a multiport distributor valve, a turntable on which the columns are rotating and a drive system for rotating the turntable.

The multiport distributor valve consists of a stationary bottom part with inlet- and outlet fluid connection ports and a rotating top part with the corresponding inlet- and outlet ports to and from the columns.

Both stationary and rotating parts of the valves are sealed together using a PTFE inner seal.

While rotating the turntable, the in- and outlet sections of the columns transport along the in- and outlet sections of the in- and outgoing process fluids of the systems stationary valve part.

As a result of the typically high number of columns 16, 20 or 30 and the flexibility of the multiport distributor valve, which allows for reconfiguration of the process flow diagram at any time, even during commercial production scale, the carousel type SMB system is more versatile than static SMB systems.

The SepTor Technology is due to its flexibility compatible for continuous counter current ion exchange, fractionation chromatography, elution chromatography or a combination of the above-mentioned modes of operation.



Process design and technical support

SepTor Technologies's objective is to offer tailor made (adsorption) process design- technology and separation solutions to clients. This can be realized through the high flexibility of flow arrangements, which can be established in the SepTor units.

An established flow arrangement is unique in its kind for any separation process, whereas the number of flow arrangements implemented will vary with the number of columns installed in the SepTor unit.

SepTor Technologies has access to fully equipped high standard laboratory facilities, for R&D or proof of principle as well as skilled chemical process design capabilities. SepTor Technologies owns a range of pilot units available for clients for demonstrating process validation on site.

Through our network of offices, SepTor Technologies guarantees fast technical support- and service to all of our clients on a worldwide basis.

Applications

- Antibiotic purification such as Gentamycin, Kanamycin and Cephalosporin.
- Pharma: API's
- Vitamins ; Vit-C, Vit-B12 etc.
- Amino acids
- Alkaloids
- Nucleotides
- Organic acids
- Chiral separations
- Amino acids
- Fine chemicals & biotechnology
- Sugar softening, glucose demineralisation, food industry
- Hydrometallurgy/mining and metal recovery in particular
- Chemicals

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