Technology Offer
Methods and devices for continuous chromatographic separation
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Keywords
Chromatographic separation, simulated moving bed process (SMB), improvement of classical SMB

Background
Chromatographic separation of a multiple-component fluid mixture utilizes differing affinities of the components to an adsorbent solid material and yields high grades of purity for chemical or pharmaceutical purposes. In batch processes conventionally used the fluid mixture flows through a single column of a solid. However, moving the solid in opposite direction to the flow allows for continuous operation, which is utilized in conventional true or simulated moving bed (SMB) processes.

Technology
Scientists from the Max Planck Institute for Dynamic of Complex Technical Systems have developed improved methods and devices for continuous chromatographic separation in a simulated moving bed process.

In a first invention, the concentration of the feed flow is varied advantageously during a cycle (MODICON-SMB), which increases significantly the effectiveness of this process compared to conventional simulated moving bed processes. In detail, the method features a 33% higher output with a nearly 40% increased product concentration. In addition the solvent consumption is reduced by 20%.

![Diagram](image.png)

FIG. 1: Principle setup of a simulated moving bed process for separation of two components A and B in a fluid mixture.
In a second invention (FF-SMB), a part of the fluid stream is branched off and meanwhile stored in tanks. Refeeding this part back in the cycle advantageously, improved the performance of the apparatus compared to conventional simulated moving bed processes. This method achieves a 90% higher output while featuring an product concentration increased by more than 200%. Further, the solvent consumption is reduced by 56%. Even compared to novel fractionation methods, the here presented method features a significantly reduced solvent consumption.

Both methods can be applied simultaneously to maximize the apparatus performance for chromatographic separation. Since both rely on simple valve switching, the methods can be easily implemented to conventional apparatus for simulated moving bed processes. Furthermore, the method was already applied successfully in a commercial pilot plant.

**Advantages**

Constructive enhancement of conventional methods

- by modulation of the feed flow concentration (MODICON-SMB)
  - +33 % increased output
  - +39 % product concentration
  - −20 % solvent consumption
- by re-feeding a branched off part flow to the cycle (FF-SMB):
  - +96 % increased output
  - +208 % product concentration
  - −56% solvent consumption
- Easy implementation in any conventional apparatus
- Applied successfully in commercial pilot plants

**Patent Information**

MODICON-SMB (Modulated Concentration)

- DE 102 35 385 B4
- US 7,479,228 B2
- EP 1 526 907 B1

FF-SMB (Fractionation and Feed-back)

- EP 1 982 752 B1
- WO 2008/125679 A1
- US 8,282,831 B2
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MODICON-SMB (Modulated Concentration)

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FF-SMB (Fractionation and Feed-back)

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Review

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