SMB Separation of Dextran-Fructose Mixtures Produced by *Leuconostoc mesenteroides* NRRL B512(f)

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In 1961 UOP developed the simulated moving - SMB - bed system in which effective counter-current flow of the adsorbent is achieved by moving the feed and draw-off points at intervals through a fixed adsorbent bed which is divided into several sections.
Since counter-current contact maximizes the driving force for mass transfer, processes of this type become economically preferable to cyclic batch processes.
SMB was firstly developed for hydrocarbon separations but in our days this technology has been used in other areas such as biotechnology and bioengineering.
The objective of this work is to use the SMB to separate fructose from dextran in a fermentation broth, obtaining one extract current rich in fructose and one raffinate current rich in dextran.
A scheme of the SMB apparatus is shown in figure 1. Twelve columns (Superformance, Merck) with 61.06 cc each were used, packed with AMBERLITE CR1320CA resin in its Ca^{2+} form (Rohm and Haas, France, SA).
Two separations were made. In the first one, a synthetic solution with 5g/l of dextran and fructose was fed to the system. The second separation was done with a fermentation broth obtained from Leuconostoc mesenteroides growth. The fermentation batch took place in a media containing 20 g/l sucrose, 7 g/l yeast extract and 8 g/l Na_2HPO_4, at 35ºC and without pH control. After cells removal and before dextran and fructose separation in the SMB bed, Na^+ concentration was assayed. This is an important step because Na^+ ions can reduce drastically the efficiency of the separation process by removing Ca^{2+} from the AMBERLITE resin.
Na^+ concentration in the final broth - 0.071 eq./l - was reduced till 0.0136 eq./l by passing the fermented broth through an ion exchange resin in Ca^{2+} form. After these procedures, the final concentrations of dextran and fuctose in the broth were 5.16 and 4.98 g/l, respectively.
Table 1 represents the results obtained for both runs. The purity for both extract and raffinate in the second run is smaller due to the presence of a small concentration of Na^+ in the fermented broth.
Once dextran is a biopolymer (not adsorbed on the resin) a much better purity was expected to be obtained. However, the small resin volume used did not allow for the obtention of better results.

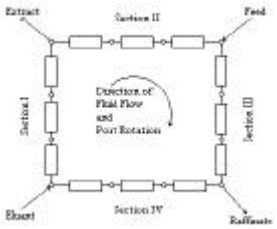

Figure 4 Scheme of an SMB unit with 3-3-3-3 configuration.

Table 1.Results from SMB separation of dextran/fructose mixtures

Solution	P_R	P_X
Synthetic	81.4%	74.2%
Fermentate	77.9%	72.2%