The inlet (feed and eluent) and the outlet lines (extract and raffinate) move one column simultaneously with the switching of the feed. SMB technology is useful for purifying drugs and for separating enantiomers. Simulated Moving Bed (SMB) technology is a continuous process where two columns are used to separate a mixture. The columns are switched between feed and eluent so that one column is absorbing a component while the other is releasing it.

Concept
- The countercurrent movement of fluid and solid is simulated by appropriate flow switching sequence.
- The inlet (feed and eluent) and the outlet lines (extract and raffinate) move one column simultaneously with constant switching time.
- Switching is in the direction of fluid phase flow.
- Such a flow switch helps in achieving most of the benefits of countercurrent operation with continuous adsorbent regeneration without any interruption in the production.

Motivation
- Due to the hybrid nature, accurate modeling and simulation of such systems become difficult.
- Scaling analysis has the potential to provide interesting insights about the SMBR without doing any detailed simulations.

Results & Discussions

Importance of second order axial dispersion
The final scaled equation is $\tilde{E}_i = \frac{\tilde{E}_i}{\epsilon}$, where $\tilde{E}_i$ is the second order axial dispersion coefficient.

The coefficient of each term is a dimensionless number representing the importance of different processes (mass transfer, dispersion, convection etc.) for the operating values given in Pais et al. (1997).

For example, the following Table displays the importance of different processes (mass transfer, dispersion, convection etc.) for the operating values given in Pais et al. (1997):

<table>
<thead>
<tr>
<th>Dimensionless Number</th>
<th>Expression</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\epsilon_1$</td>
<td>$D_s/\epsilon V_{L}$</td>
<td>0.0005</td>
</tr>
<tr>
<td>$\epsilon_2$</td>
<td>$(1-\epsilon)D_s/\epsilon V_{L}$</td>
<td>0.3989</td>
</tr>
<tr>
<td>$\epsilon_3$</td>
<td>$\epsilon_1/\Delta x_s$</td>
<td>0.1692</td>
</tr>
<tr>
<td>$\epsilon_4$</td>
<td>$(1-\epsilon)D_s/\epsilon V_{L}$</td>
<td>0.2536</td>
</tr>
</tbody>
</table>

The term to which $\epsilon_1$ multiplies is of negligible importance. That is, the second order axial dispersion term is negligible for this case. However, if the length of the zone ($\epsilon$) is small enough, then the influence of the axial dispersion term has to be considered.

References

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