

Problem

- Lincomycin A and B are chromatographed through a bed of cellulose beads with a solvent system of butanol, acetic acid, and water. The total volume of the bed is 100 liters and void fraction is 0.35. The where y_0 is the initial concentration caused by the pulse and V is the volume of the upper tank. equilibrium constants K have been previously measured as 10.2 and 11.8 for A and B, respectively. Estimate the volume of eluate at which the peak will occur for each of these materials.
- In the process described in the problem above, we observe that 2.2% and 15.8% of the lincomycin A were collected at eluate volumes of 600 and 650 liters, respectively.
 - (a) Determine the quantity of eluate that must be collected to obtain a yield of 95% of lincomycin A.
 - (b) If the composition of the original mixture was 85% A and 15% B, determine the purity of the A rich product obtained in part (a). Assume σ for both solutes is the same.

Problem

- Two solutes have a linear equilibrium with the stationary phase. Their equilibrium constants are 6.5 and 6.6, respectively. The task is to separate 20 ml of the mixture on a column 5 cm in diameter. The flow rate is 10 ml/min. Determine the minimum column length required to just separate the two compounds, with $\epsilon = 0.3$.
- It is desired to scale up the throughput by a factor of 150 for a linear gradient ion exchange chromatography of a product protein from the laboratory to the plant. The conditions for the laboratory chromatography are the following: 1.0 cm bed diameter (ID) \times 20 cm bed height, 20 μm particle size, and 30 cm/h superficial velocity. The particle size of the same type of ion exchange resin available for the plant operation is 40 μm . Two columns are available in the plant: one column 14.0 cm diameter (ID) \times 50 cm high, and another column 18.0 cm diameter (ID) \times 50 cm high. To keep the resolution for the chromatography constant in the plant, which column should be used? For this column, what should be the resin bed height and the superficial velocity and what do you estimate the pressure drop to be? The viscosity of the mobile phase is 1.0 cp, and the void fraction for resin in the plant column is 0.33.