Average Score of Homework Set 2: 9/10

26.2. The general elution problem arises whenever chromatograms are obtained on samples that contain species with widely different partition ratios. When conditions are such that good separations of the more strongly held species are realized, lack of resolution among the weakly retained species is observed. Conversely, when conditions are chosen that give satisfactory separations of the weakly retained compounds, severe band broadening and long retention times are encountered for the strongly bound species. The general elution problem is often solved in liquid chromatography by gradient elution; temperature programming serves the same purpose in gas chromatography.

26.5. In liquid-liquid chromatography the stationary phase is a liquid which is immobilized by adsorption or chemical bonding to a solid surface. The equilibria that cause separation are distribution equilibria between two immiscible liquid phases. In liquid-solid chromatography the stationary phase is a solid surface and the equilibria involved are adsorption equilibria.

26.6. Variables that affect the selectivity factor α include the composition of the mobile phase, column temperature, composition of the stationary phase and chemical interaction between the stationary phase and one of the solutes being separated.

26.7. In gas chromatography the capacity factor is varied by changing the column temperature (temperature programming). In liquid chromatography, variation is accomplished by altering the composition of the solvent (gradient elution).

26.10. The minima observed in plots of plate height vs. flow rate are caused by longitudinal diffusion, which in contrast to other broadening sources goes on to a greater extent at low flow rates than at high flow rates. The rate of longitudinal diffusion is, however, orders of magnitude larger in a gaseous mobile phase than it is in a liquid. Thus the phenomenon becomes noticeable at higher flow rates in gases than in liquids.