

172e A Nonlinear Two-Phase Model to Relate Semiequilibrium Dialysis and Ultrafiltration Results for Arsenic Solutions

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Ultrafiltration membranes in combination with cationic amphiphilic aggregates can be used to remove molecular arsenic from drinking water. In the removal of arsenic anions, the cationic amphiphilic molecule hexadecylpyridinium chloride is added to the water, and the arsenic anions bind to the surface of the aggregates due to electrostatic interactions. The resultant aggregates are physically too large to pass through the ultrafiltration membrane pores, and are retained on the concentrate side. The concentrations of arsenic anions passing through the ultrafiltration membrane pores are practically the same as the permeate concentrations of these species in the analogous semiequilibrium dialysis experiments. In this study, a nonlinear equilibrium model, combining the simple two-phase polyelectrolyte theory of Oosawa with thermodynamic activity, material balance, and charge balance equations, successfully correlates ultrafiltration and equilibrium dialysis results for arsenic solutions.