

Gradient Formation in Membrane Unit for Differential Precipitation of Proteins

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A new protein fractionation technique presented transfers ammonium sulfate to create a gradient of ammonium sulfate inside a membrane unit for differential precipitation of proteins called "centrifugal precipitation chromatography." Because it does not require any solid support, it should provide a better alternative to the conventional chromatography with solid stationary phase. To understand the phenomena and achieve a better separation, a mathematical model explaining the ammonium sulfate gradient formation inside the stationary membrane unit is investigated. The model is extended with empirical correlation to the centrifugal membrane unit—a new approach for protein purification. The model agreed well with the experiments for both stationary and centrifugal units. Upon using the model to calculate the ammonium sulfate gradient formation in a membrane unit, this new technique can be useful in separating a mixture of proteins whose solubility in ammonium sulfate solution differs. To demonstrate the technique experimentally, mixtures of proteins are loaded into the column; the partial resolution between proteins is achieved with the step concentration switch of the inlet ammonium sulfate solution.

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