

## Development of Carousel Ion-exchange Processes for the Removal of Zinc Ions from a Protein Mixture

문성용\*

한양대학교 화학공학과

(munsy@hanyang.ac.kr\*)

Chelex 100 is a highly effective adsorbent for the separation of metal ions from proteins for three reasons; it has a high affinity for metal ions; proteins with molecular weight of 1,000 or higher are excluded from the particle pores; it also allows high flow rates because it can stand a pressure drop up to 100 psi. In this study, a carousel process based on Chelex 100 has been developed for the removal of zinc ions from a protein solution. The intrinsic parameters for the carousel design were estimated from a series of single column experiments, which showed that Chelex 100 has a high selectivity for zinc ions in 1 N acetic acid and it can be effectively regenerated using 0.1 N HCl. The exchange mechanisms between  $Zn^{2+}$  and  $H^+$  on Chelex 100 were studied and considered in rate model simulations. The effective zinc isotherm was found to be unfavorable in 1 N acetic acid. A design method based on the Standing Wave Analysis for unfavorable isotherm systems has been developed in this study to ensure high product purity and high yield in carousel ion-exchange processes.