

Study on Estimation of Charged Mosaic Membrane Performance

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Summary

Our goal is to establish a novel separation technology for salt enrichment using charged mosaic membrane, which has two different charges, cation and anion exchange sites. For the practical application, a fundamental study such as elucidation of material transport mechanism will be required. In previous study, we indicated that the simple electrolytes in solution are preferentially transported more than solvents(water) across the charged mosaic membrane and the salt enrichment by pressure dialysis are prospective. For the potential application, the charged mosaic membrane should be reinforced with support membrane. In this study the transport characteristics across the composite membrane with reinforcement were investigated extensively and compared with the previous studies, which were examined with the membrane without reinforcement.

Membrane: Composite charged mosaic membranes obtained by casting the mixed solution of cationic microsphere gel(4VP/DVB) and anionic microsphere gel(SSNa/DVB) on the support membrane were supplied from Dainichi-Seika Color & Chemicals Mft Co. The membranes were deposited in 0.1 mol dm^{-3} KCl solution before experimental use.

Transport studies: The cell for experiment is consisted of two half glass cells and the charged mosaic membrane was tightly clamped between the two cells. Temperature was kept constant by circulating $25 \text{ }^{\circ}\text{C}$ water around the two cells during experiment. Two kinds of measurements, the volume changes and concentration changes of electrolyte solutions across the membrane were mainly measured as functions of time by using a graduated capillary and an electrode type conductive meter, respectively.

From the obtained volume flux, J_v and salt flux, J_s three important membrane parameters were deduced. As a result, the charged mosaic membranes with and without reinforcement exhibited the identical membrane performance.