

A BASIC STUDY ON CONCENTRATION OF SEA WATER DRIVEN BY PRESSURE DIFFERENCE(3)

Akira YAMAUCHI

Department of Chemistry, Faculty of Science, Kyushu University

Summary

A pressure dialysis is an attractive salt separation method from sea water. Our aims are to get fundamental understanding of salt transport phenomena and to make a way to potential application through the analysis based on nonequilibrium thermodynamics. Up to the present, we have estimated the membrane parameters such as filtration coefficient, L_p , reflection coefficient, σ , and solute permeability, ω characterized by the charged membranes. In particular, σ in the charged mosaic membrane indicated the negative value and suggested preferential salt transport. On the other hand, a streaming potential, Ψ produced under the same condition is closely related to these membrane parameters and the electroosmotic coefficient, β which can be obtained from the streaming potential provides the information concerning salt transport.

In this work, 3 charged membranes, an amphoteric ion exchange membrane, a charged mosaic membrane and a cation exchange membrane which indicate the different charge morphologies within the membranes were investigated for the streaming potential. Under the appropriate osmotic pressures which were generated by sucrose, the streaming potentials were measured. A pair of Ag/AgCl electrodes were used as the electromotive force measurements and alkali metal chloride solution-the charged membrane systems were investigated. The obtained streaming potentials were analyzed as a function of osmotic pressure differences and the electroosmotic coefficients, β , were estimated for different alkali metal chlorides.

As an interesting result, β in case of the charged mosaic membrane exhibited the smallest value in the three charged membranes. This suggests that the charged mosaic membrane enables the salt to transport in preference to the solvent. In the same charged mosaic membrane, Li ion indicated low electroosmotic coefficient. These parameters together with the previous results were discussed in relation to the salt and solvent transports.