

Material transports such as water, electrolyte and non-electrolyte through the charged mosaic membrane

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Summary

Recently composite charged membranes with unique membrane characteristics such as charged mosaic membrane have been produced and the membrane properties or membrane characteristics have been discussed as compared with ordinary charged membranes. The charged mosaic membrane is well known as the membrane containing two different charges within the matrix. The two kinds of charges, anion and cation exchange groups, are arranged parallel to each other in the membrane and the array of charged groups links continuously from one membrane surface to the other surface.

At previous study, it was indicated that the charged mosaic membrane and the composite membrane with support could preferentially transfer the electrolytes more than the solvent, water (negative σ). In this study, a material transport across such charged mosaic membranes was investigated under different experimental conditions. Firstly KCl / water system was prepared for reference. On the other hand KCl was added in one phase and sucrose was added in other phase across the membrane (KCl/sucrose system). The solute concentrations in both phases were kept at same equivalent concentration to cancel apparently the osmotic flow each other. The volume fluxes and the solute fluxes on these systems were measured and the results were compared with KCl / water system.

As a result, volume fluxes in both KCl / water and KCl / sucrose systems indicated negative values. Although in KCl / sucrose system, the osmotic pressure was equivalent in both phase, negative volume fluxes were caused by KCl diffusion. Solute fluxes in KCl / water was increased with KCl concentration, but in KCl / sucrose system, the solute fluxes were very low compared with other two systems.

Volume fluxes getting rid off the influence of permeation by sucrose were almost similar behaviors in each system. Hence it was elucidated that water transport driven by only KCl diffusion has no difference in each system and is independent of permeation by non-electrolyte.