# Proposal of a new evaluation method of RO performance using dialysis

Kensaku Mizoguchi
Dept. of Materials Sci. & Chem. Eng.,Shizuoka Univ.

Though Japan has a high level desalination system using reverse osmosis technique (RO), all of R&D work have been done only by the private companies. Even when new polymer materials are synthesized, optical or electronic properties are evaluated. One of the reasons why much attention is not paid to membrane separation properties is that we don't have a simple and rapid evaluation method for RO properties. In the usual RO evaluation method, we need high pressure.

Here, we propose a two stage dialysis method for evaluating RO membrane performance. Through the method, we can obtain three parameters of membrane permeation : $L_p$(water permeability), $\sigma$ (reflection coefficient of salt), $\omega$ (salt permeability). In the method, we don't need high pressure. For applying the new method, though we have to take into account the pressurized effect, we can expect to obtain approximate RO performance because membranes become much dense when being dipped in an aqueous salt solution.

In the two stage dialysis method, first of all, we measure permeation fluxes of salt and water. By changing osmotic pressure, namely by changing salt concentration of one side cell of the membrane, we can obtain a combined value of $L_p \sigma$. To obtain the values of $L_p$ and $\sigma$ ,independently, we need another dialysis where the third substance with larger size molecule which can generate osmotic pressure without its permeation ( $\sigma$ =1). In the second dialysis, concentrations of salt of both cells are set to be equivalent. Due to the osmotic pressure generated by adding the third substance, we can observe new water permeation. From the result, it is possible to get $L_p$ and then the $\sigma$ value of the salt used. Moreover, we can determine the value of $\omega$ using those two values and permeation fluxes of both water and salt.

For a cellulose acetate membrane, we determined the values of three parameters through the proposed method, and compared to the reported ones for RO experiment. In spite that we didn't apply the same membrane, the values of both cases were very similar. The results suggest that the new method is applicable for estimation of RO performance of a membrane.