

THE DEPENDENCE OF THERMAL AND CONCENTRATION MEMBRANE POTENTIALS
ON THE EXTERNAL SALT CONCENTRATION

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Summary

Silver-silver chloride electrodes were directly inserted in the solutions on two sides of a membrane to measure concentration membrane potential at high salt concentrations. The relationship between the mobility ratio of ions in membranes and that at the limiting dilution was studied. Thermal membrane potential is interested because it concerns with the entropy of ions. However the measurement of the membrane potential is little due to the difficulties of measuring thermal membrane potential. Then a new cell was constructed to handle easily it.

(1) Sulfoethyl cellulose and cellulose acetate membranes AS-10 and SA-15 which have low ion-exchange capacities were used for concentration membrane potential at high salt concentrations. (2) The new thermal membrane potential cell has a narrow channel of the solution to disturb a diffusion layer on the membrane surface. Anion-exchange membranes Aciplex A-201, A-211 and Neosepta AM-1 were used for thermal membrane potential.

(1) Mobility ratios of counterions were similar each other for membranes SA-10 and SA-15 and nearly equal to that in free salt solutions at the limiting dilution. Considering the above results we may assume that the mobility ratio of counterions in the usual membranes was constant and the same at the limiting dilution in the wide range of external salt concentrations. The effective concentration of fixed charges increased with the order of KCl, NaCl and LiCl at high salt concentrations although that is nearly constant at low salt concentrations. (2) The new simple thermal membrane potential cell with narrow channel was pretty good as a whole compared with the cell which has a nozzle of the solution inlet to disturb a diffusion layer on the membrane surface. The data of thermal membrane potential measured with the new cell agreed with the feature expected by a theory.