Permeability of Some Ions through Charged Cellulosic Membranes

I.G.SHIN and S.M.PAK

Dept. of Textile Eng., Pusan National Univ,
Pusan 609-735, Korea

Transport phenomena such as permeation and Membrane potential of Membranes have received a great deal of attention to elucidate the permeability of ions through biological and Synthetic membranes. Permeation through charged membranes has been widely investigated by many researchers. However, the degree of the ion permselectivity achieved is not sufficient for a wide use of a practical membranes.

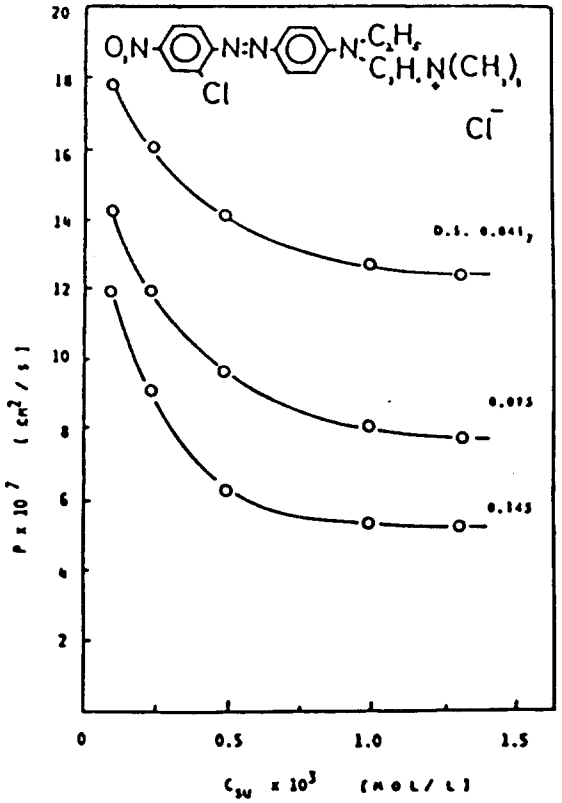

Fig.1. Permeability Coefficient in Carboxymethyl Cellulose Membranes

In this present work the permeability of tetraalkylammonium chlorides(TAACl), alkali metal chlorides (AMC) and a cationic dye chloride(DCl) was measured. The permeability coefficient P against the concentration of the external salt solution, Csu, was quite different between TAACl, AMC and DCl. AMC and

TAACl gave an usual pattern of the dependence of P on Csu. The small value of P due to Donnan exclusion in the low concentration range increases with increase of Csu. On the contrary, DCl gave a decrease of P with dye concentration as shown in Figure 1.

The results of TAACl and AMC can be interpreted by means of TMS theory. The effective charged group concentration in the membranes was found to depend on the ionic species. The greater the Stokes radious the larger the effective charge density of the membranes. This is consistent with a sequence of alkali metal ions.

The results of DCl can be interpreted by considering the dual mode of the interaction between dye and polymer. The difference of the permeation behaviour between DCl and TAACl is attributed to the heigher affinity of the larger dye ion.

References ;

(1) S.PAK, J.Kor. Soc. Text. Eng. Chem., 24, 76 (1987)

(2) T. Teorell, proc. Soc. Exp. Biol. Med., 33, 282 (1935)

(3) K. H. Meyer and J. F. Sievers, Helv. CHim. Acta, 19, 649 (1936)