

## Effect of ionic strength on ion exchange equilibrium between cationic membranes and $K^+/Na^+$ , $K^+/Li^+$ and $Na^+/Li^+$ binary systems

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### ABSTRACT

Ion exchange membranes are receiving considerable attention and are successfully applied for desalination and for treating industrial effluents. They are efficient tools for the concentration or separation of food and pharmaceutical products containing ionic species. Extensive work has been reported on synthesis, characterization, properties and applications of these membranes. In this work ion exchange isotherms for the binary  $Na^+/K^+$ ,  $Li^+/K^+$ , and  $Li^+/Na^+$  were established at various ionic strengths, using CRP cationic membrane. All experiments were carried at 25°C, by setting the ionic strength in the range of  $I = 0.1\text{--}1.5 \text{ mol}\cdot\text{l}^{-1}$ . All the results given by this membrane were compared with those obtained, in the same conditions, with CMX membrane. For the two membranes, up to ionic strength  $1.5 \text{ mol}\cdot\text{l}^{-1}$  affinity order was:  $K^+ > Na^+ > Li^+$ . Selectivity coefficients  $K_{Na^+}^{K^+}$ ,  $K_{Li^+}^{K^+}$ , and  $K_{Li^+}^{Na^+}$  for homogenous CMX membrane were greater than those determined for heterogeneous CRP membrane. For low ionic strength till  $I = 0.2 \text{ mol}\cdot\text{l}^{-1}$ , these selectivity coefficients decrease strongly and tend asymptotically to unity for higher values of  $I$ . The product of selectivity coefficients  $K_{Li^+}^{Na^+} \cdot K_{Na^+}^{K^+} \cdot K_{K^+}^{Li^+}$  were always close to unity.

*Keywords:* Ion exchange membrane; Selectivity coefficients; Isotherms; Binary system; Ionic strength

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