

Electro-Osmosis of Water Through a Collodion Membrane

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Abstract

Electro-osmosis of water through a collodion membrane has been studied. The data confirmed the existence of a threshold potential difference in the case of electro-osmosis. The data also confirmed that the electro-osmotic velocity is given by an exponential type of relationship. The efficiencies of electro-kinetic energy conversions have been calculated and the results thus obtained have been discussed in the light of Non-Equilibrium Thermodynamics.

Introduction

In the recent preliminary studies [1] on electro-osmosis of water through a collodion membrane it was observed that no electro-osmosis takes place unless the applied electrical potential difference exceeds a certain threshold value. Since this observation is quite unusual and has not been reported in literature earlier, the experiments have been repeated for confirmation of the unusual form of the phenomenological relation for the water flux in presence of both, a pressure difference and an electrical potential difference. It has been indicated that the existence of the threshold potential difference may be due to the double layer overlap in the narrow capillaries of the collodion membrane. The data have been further utilized to calculate the efficiencies of electro-kinetic energy conversion for both modes of conversions namely electro-osmosis and the streaming potential. The results thus obtained have been discussed in the light of the theory, Non-Equilibrium Thermodynamics delivers for electro-kinetic energy conversion.

1. Experimental

Membrane Preparation: The casting solution was prepared by shaking 5.43 gm of pyroxylin (BDH) in a mixture containing 68.48 gm of ether (BDH) and 26.10 gm absolute alcohol. The membrane was prepared by evaporation technique, casting

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