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Electrodialytic transport properties of cation exchange membranes prepared from poly(vinyl alcohol) and poly(vinyl alcohol-co-2-acrylamido-2-methylpropane sulfonic acid)

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ABSTRACT

In this study, cation exchange membranes with an interpenetrating network structure were prepared by blending poly(vinyl alcohol) (PVA) and a polyanion, poly(vinyl alcohol-co-2-acrylamido-2-methylpropane sulfonic acid). The membranes obtained were physically cross-linked by annealing them and chemically cross-linked by reaction with various concentrations of glutaraldehyde (GA) aqueous solutions. The effect of the cross-linking conditions and polyanion content on the ionic transport properties through the membranes was investigated. The water content of the membranes increases with increasing polyanion content and with decreasing GA concentration. The charge density of the membranes increases with increasing polyanion content and have a maximum value. The maximum value increases with increasing GA concentration. The dynamic transport number of the membranes increases with increasing polyanion content and with increasing GA concentration while the membrane resistance increases with increasing GA concentration. These results indicate the transport properties of the PVA-based cation exchange membranes can be controlled by changing the polyanion content and the cross-linking conditions. The membranes will have potential application in the desalination of salt water.

Keywords: Poly(vinyl alcohol); Cation exchange membrane; Cross-linking conditions; Ionic transport property

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