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One-pot approach to prepare internally cross-linked monovalent selective anion exchange membranes

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Abstract

In this study, high performance internally cross-linked monovalent selective anion exchange membranes were prepared via a one-pot approach by simply adding different amounts of sulfamerazine (SF) to partially-quaternized chloromethylated polysulfone (QPSF). The composition and structure of the prepared membranes were studied by Fourier transform infrared spectroscopy (FT-IR), Scanning electron microscope (SEM) and Atomic force microscopy (AFM). The monovalent anion selectivity was evaluated by electrodialysis using a $\text{Cl}^-/\text{SO}_4^{2-}$ system. The experimental results show that all QPSF-SF-x membranes exhibit excellent monovalent anion selectivity ($P_{\text{SO}_4^{2-}}^{\text{Cl}^-} = 3.98\sim 15.90$) at an average pH level of 6.0 because of the presence of sulfamerazine, which can change the compactness and electronegativity of the QPSF membranes. Especially, the optimized QPSF-SF-0.09 membrane had a permselectivity of 24.55 at pH 10.0 and showed an excellent permselectivity in alkaline condition. Based on an overall consideration of the facile synthesis procedure and the excellent monovalent ion selectivity of the resulting membranes, this process is expected to inspire the further investigation of monovalent anion selective membranes.

Keywords: One-pot; Sulfamerazine; Monovalent anion selective membrane; Internal cross-linked; Electrodialysis

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