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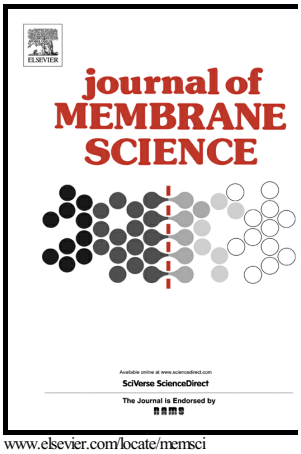

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Diffusion dialysis membranes with semi-interpenetrating network for acid recovery

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Abstract Semi-interpenetrating polymer networks (sIPN) based on anion exchange membranes (AEMs) for acid recovery process were fabricated by immobilizing polyvinyl chloride (PVC) in dimethylaminoethyl methacrylate (DMAM) and divinylbenzene (DVB) copolymer (P(DMAM-co-DVB)). Prepared membranes were fully characterized in terms of FTIR, TGA, ion exchange capacity (IEC) and water uptake (W_R) etc. Membrane structure and performance can be tuned by varying the content of PVC and dosage of cross-linking agent as well. Consequence of PVC content plus the cross-linking degree on ion permeability and selectivity was discussed in brief. Results revealed that the prepared membranes possess excellent thermal and acid stability due to the incorporation of chemically stable PVC matrix and the formation of sIPN morphology. Acid dialysis coefficients (U_H) appeared in the range of 0.012-0.040 m/h and separation factors(S) ranged from 36 to 61 at 25^{o}C. These obtained values are much higher than that of commercial membrane DF-120 (0.009 m/h for U_H, 18.5 for S). This methodology can be effortlessly scaled up and the obtained membranes could be an encouraging candidate for the acid recovery process via diffusion dialysis.

Key words: Anion exchange membrane; Polyvinyl chloride; Acid recovery; Diffusion dialysis; Semi-interpenetrating network

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