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Desalination properties of a novel composite membrane with a lamination method

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ABSTRACT

Side chain crosslinked (C-SFPEx-CMy) sulfonated poly(arylene ether) (SPAE) membranes containing fluorine moiety with varying degree of sulfonation (DS) were prepared and evaluated for use as a thin-film composite membrane for seawater desalination. C-SFPEx-CMy membranes were obtained by covalent crosslinking among ethynyl groups at the polymer side chain through thermal curing. The crosslinked network structure suppressed the water uptake and swelling ratio. A novel type of composite membranes (TC-SFPEx-CMy) were prepared side chain crosslinked SPAE layer containing fluorine moiety on top of PET non-woven with epoxy resin as bonding agent. TC-SFPEx-CMy show the increase in NaCl rejection as DS decreases from 30% to 70%. NaCl rejection of the membranes increased with increasing corsslinking moiety (CM) while water permeability decreases due to the crosslinked net work structure. Particularly, crosslinked membrane of 30 mol % of CM could enhance the salt (NaCl) rejection property up to 85.3 % as compared to of crosslinked membrane (69.5%) containing 10 mol % of CM under same DS. However crosslinked membrane showed the decrease in water permeability from 6.89 L/m^2·h (TC-SFPE30-CM10) to 2.06 L/m^2·h (TC-SFPE30-CM30). For TC-SFPE30-CM30 membrane, the order of salt rejection was observed Na_2SO_4 > NaCl > $MgSO_4$ > $MgCl_2$.

Keywords: Composite membrane; Seawater; Lamination method

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