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Application of high performance FO nanofibers based membrane for model and real seawater desalination

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ABSTRACT

The performance evaluation of forward osmosis (FO) nanofibers based membranes against model solutions and real seawater were investigated. The desalination of seawater performed using 2 M NaCl as a draw solution. Performance data showed that when real seawater used as a feed solution, the newly fabricated FO membrane has a water flux of 15.1 and 49.4 LMH in both co-current FO and co-current pressure retard mode (PRO) respectively. Two different model solutions (NaCl and $MgSO_4$), have a salt concentration equal to that of the real seawater sample, were prepared to characterize the performance of the fabricated membrane against them under the same operating conditions. The flux obtained in 1.1% model NaCl in FO mode was 8 LMH, whereas in PRO mode was 54 LMH and 10.3 LMH in FO mode, whereas 45.6 LMH in PRO mode for model 1.1% $MgSO_4$ solution using 2 M NaCl solution as a draw solution. The structural parameter (*S*-value) of the sulfonated polysulfone (sPSf) thin-film-composite membrane is estimated to be 125 μm, which is considered one of the smallest values ever reported in the literature. In this manuscript, the performance study of thin-film composite (TFC-FO) nanofiber flat-sheet membrane on sPSf substrate is proven that fabricated membranes are perfectly meet the high rejection ratios whether strong enough to sustain high flux and durability through the operation.

Keywords: Forward osmosis; Desalination; Thin-film-composite membrane; Sulfonated polysulfone; Electrospining

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