Application of a FO/MD-combined system for the desalination of saline solution

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ABSTRACT

The objective of this study was to systematically investigate the effects of draw solution (DS) chemistry on the performance of a forward osmosis (FO)/membrane distillation (MD)-combined system, and to apply the integrated system to the desalination of a saline solution. Extraction of pure water from saline water was conducted by the FO process, and subsequent production of fresh water and recovery of draw solutes from the DS diluted by the FO process were achieved by MD. Experiments at various temperatures, concentrations, and types of DS showed that the diffusion coefficient of the draw solutes and interaction of the salt ions with water molecules caused severe effects on the performance of the integral system, along with the temperature and concentration of the DS. This study suggests that optimum operating conditions and selection of proper draw solutes with higher diffusion coefficients and lower hydrophilicities can make the FO/MD-combined process a promising candidate for the desalination of saline water.

Keywords: Forward osmosis; Membrane distillation; Draw solution; Desalination