Study on vacuum membrane distillation of PP hollow fiber membranes used in concentrated seawater from low-pressure reverse osmosis

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ABSTRACT

Concentrated seawater from low-pressure reverse osmosis (RO) was treated by membrane distillation technology (MD). Hydrophobic polypropylene (PP) hollow fiber was fabricated by the melt-spinning method. The microstructure of the PP hollow fiber membrane was observed. The effects of NaCl concentration, flow rate, and temperature on water flux and rejection rate were studied. The results showed that water flux and salt rejection rate changed a little with increasing initial concentration of NaCl solution. Water flux increased greatly with the increase in feed temperature, vacuum pressure and solution flow rate. The scanning electron microscopy (SEM) result indicated that the slit-like micropore size well formed with the maximal pore size 0.05 μm wide while 0.3 μm long. In this work, the maximal water flux reached 7.8 L/m²h, and the rejection ratio of NaCl was above 99.9%.

Keywords: Membrane distillation; Polypropylene; Hollow fiber; Distillation

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