



Effect of transmembrane pressure on draw solution channel height and water flux in spiral wound forward osmosis module

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ABSTRACT

An 8-inch commercial spiral wound forward osmosis (FO) module was tested to investigate the effect of transmembrane pressure on the performance of the FO membrane. A coupon taken from the FO module was tested in a lab-scale FO system to determine water and solute permeability of the membrane. The positive transmembrane pressure enhances the water flux of the FO module, and interestingly the amount of the flux enhancement exceeds the multiplication of the water permeability and the transmembrane pressure. This abnormal flux enhancement is caused by the shrunken draw solution (DS) channel height, which is clearly verified by the hydraulic tests in this work. The shrunken DS channel height makes the effect of external concentration polarization smaller, which should be one of the potent reasons for the additional flux enhancement. This finding suggests that an adequate transmembrane is effective to operate FO systems using spiral wound modules to extract better performance of the modules.

Keywords: Forward osmosis; Spiral wound module; Draw solution channel height; Water flux enhancement

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