Draw solute recovery by metathesis precipitation in forward osmosis desalination

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Received 2 September 2012; Accepted 10 December 2012

ABSTRACT

Forward osmosis (FO) is a natural osmosis process that is under investigation as a potential means of desalination, wastewater treatment, and energy production. This article presents forward osmosis desalination study on a commercial cellulose acetate membrane. The membrane was tested for high feed concentrations ranging from typical brackish water concentration to seawater concentration. For energy-efficient recovery of product water, a 240,000 ppm of MgSO4 draw solution was used. The membrane achieved an average water flux of 4.06 and 0.60 L/m² h in case of brackish and seawater, respectively. Pure product water with a salt content of 350 ppm was recovered from the diluted MgSO4 draw solution by reaction with stoichiometric amount of barium hydroxide to remove the soluble draw solute as magnesium hydroxide and barium sulfate precipitates.

Keywords: Forward Osmosis; Desalination; Direct Osmosis; Cellulose Acetate; Magnesium Sulfate

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