

Desalination and Water Treatment

www.deswater.com

1944-3994/1944-3986 © 2012 Desalination Publications. All rights reserved doi: 10.1080/19443994.2012.719466

49 (2012) 368–375 November



## Direct contact membrane distillation for seawater desalination

Mohammad Mahdi A. Shirazi<sup>a</sup>, Ali Kargari<sup>b,\*</sup>, Mohammad Javad A. Shirazi<sup>c</sup>

<sup>a</sup>Young Researchers Club, Omidieh Branch, Islamic Azad University, P.O. Box 164, Omidieh, Iran <sup>b</sup>Membrane Processes Research Laboratory (MPRL), Department of Petrochemical Engineering, Amirkabir

University of Technology (Tehran Polytechnic), Mahshahr Campus, Mahshahr, Iran

Tel. +98 652 2343645; Fax: +98 652 2341546; email: kargari@aut.ac.ir

<sup>c</sup>Young Researchers Club, Science and Research Branch, Islamic Azad University, Tehran, Iran

Received 30 November 2011; Accepted 18 June 2012

## ABSTRACT

Membrane distillation (MD) is a non-isothermal membrane separation process. It is based on the phenomenon that pure water in its vapor state can be extracted from aqueous solutions, with vapor passing through a hydrophobic microporous membrane when a temperature difference is established across it. In this work, three commercially available hydrophobic microporous membranes were used for seawater desalination via direct contact MD. The effects of pertinent operating parameters on the permeation flux have been studied. A plate and frame module was used for seawater desalination. Long-term performance evaluation was carried out to evaluate the process as a stand-alone desalination alternative. The results indicated that polytetrafluoroethylene membrane had the best performance when a hot feed temperature of 80 °C with 800 ml/min flow rate was used. At optimum condition a 99.99% salt rejection was achieved.

*Keywords:* Seawater desalination; Direct contact membrane distillation (DCMD); Permeate flux; Hydrophobic membrane; Polarization

<sup>\*</sup>Corresponding author.