



## Performance evaluation of vacuum membrane distillation for desalination by using a flat sheet membrane

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Received 5 December 2009; Accepted 5 March 2010

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### ABSTRACT

Vacuum membrane distillation (VMD) process received a great deal of attention by many investigators because of its promising applications in several separation areas. It is a rising technology for seawater or brine desalination process. The process simply consists of a flat sheet hydrophobic microporous PTFE membrane and diaphragm vacuum pump without a condenser for the water recovery or trap. In this work, VMD performance was investigated for aqueous NaCl solution. In order to enhance the performance of the VMD process in desalination, that is, to get more flux, it is necessary to study the effect of operating parameters on the yield of distillate water. The influence of operational parameters such as feed flow rate, feed temperature, feed salt concentration and permeate pressure on the membrane distillation (MD) permeation flux have been investigated. The VMD performance showed that this device could reach a desalting degree of 99.99% which was not affected by feed concentration. The membrane distillation flux reached 14.62 kg/m<sup>2</sup> h at 333 K bulk feed temperature, 1.5 kPa permeate pressure, 54 l/h feed flow rate, and 30,000 mg/l feed concentration. With these chosen operating conditions, experiments with concentrated salt water showed a permeate flux decreases with time, but these reduction is less than 14% over a long term experimentation. However, this fouling is reversible and easily removed by a water washing. This study promotes the research attention in apply of VMD for over-concentrated salt water means rejected brines of reverse osmosis process.

*Keywords:* VMD; Hydrophobic PTFE flat membrane; Desalination; MD

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