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Comparison of three membrane distillation configurations and seawater desalination by vacuum membrane distillation

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ABSTRACT

Three membrane distillation (MD) configurations, vacuum membrane distillation (VMD), sweeping gas membrane distillation (SGMD) and direct contact membrane distillation (DCMD), have been experimentally studied in a shell-and-tube capillary membrane module using sodium chloride aqueous solutions as feed. The flux, fresh water conductivity and desalination rate were compared. Preliminary experiments by VMD were carried out using seawater and sodium chloride aqueous solutions with the same salinity as seawater as feed. The influences of operating parameters: the flow rate, feed temperature, concentration, and permeate vacuum, have been investigated. The saline solution had higher flux than seawater since the membrane fouling. The membrane fouling was analyzed by SEM and the results indicate that embrane fouling is very serious in seawater desalination by VMD which resulting that the flux decreases obviously with operating time.

Keywords: Membrane distillation; Polyvinylidene fluoride (PVDF); Hydrophobic hollow fiber membrane; Vacuum membrane distillation (VMD); Sweeping gas membrane distillation (SGMD); Direct contact membrane distillation (DCMD)

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