

Water desalination by air-gap membrane distillation using meltblown polypropylene nanofiber membrane

ABSTRACT

This paper presents a study of air gap membrane distillation (AGMD) using meltblown polypropylene (PP) nanofiber membrane to produce fresh water via desalination process. PP nanofiber membranes with the effective area 0.17 m² are tested with NaCl solutions (0.5 – 4.0 wt.%) and seawater as the feed solutions (9400 – 64800 $\mu\text{S}/\text{cm}$) in a tubular membrane module. Results show that the flux decreases with increasing the membrane thickness from 547 to 784 μm . The flux increases with the feed flow rate and temperature difference across the membrane. The feed concentration affects the flux insignificantly. The AGMD system can reject the salts at least 96%. Water vapor permeation rate is relatively higher than solute permeation rate resulting in the conductivity value of permeate decreases when the corresponding flux increases. The AGMD system produces the fresh water (200 – 1520 $\mu\text{S}/\text{cm}$) that is suitable for drinking, fisheries or irrigation.