

Seawater desalination using PVDF-HFP membrane in DCMD process: assessment of operating condition by response surface method

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Abstract

Central composite design (CCD) was applied in this work to analyze the performance of poly(vinylidene fluoride-co-hexafluoropropylene) (PVDF-HFP) flat sheet membrane in the seawater desalination using direct contact membrane distillation (DCMD) process. It is the most popular in response surface method (RSM). Development on Quadratic Regression model for membrane performance as a function of the operating conditions was studied. The ranges for each operating condition were selected as follows: feed temperature (T_f): 48–58 °C, feed flow rate (Q_f): 80–180 mL/min, permeate temperature (T_p): 17–22 °C and permeate flow rate (Q_p): 80–180 mL/min. The model R-squared of 0.9759 (adjusted to degree-of-freedom), Lack-of-fit test ($p = 0.4764$), predicted residual error sum of squared (PRESS) statistic of 10.3 suggest that the model is adequate to correlate the impact of operating conditions on permeates. ANOVA analysis showed that factors as feed flow rate, feed temperature, and permeate temperature have a valuable impact ($p \leq 0.05$) on the response variable. Additionally, the interaction among feed.