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# Analysis and Design of Direct Contact Membrane Distillation

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## Abstract

Direct contact membrane distillation (DCMD) is an attractive thermal based desalination technique because of its potential to provide high rejection rates, simple construction and low construction cost. Clean water recovery rate and thermal efficiency of DCMD are the two most important metrics governing its design that are strongly influenced by the temperature polarization effects and parasitic heat losses. The objective of the present study is to conduct a systematic numerical analysis focusing on exergy destruction inside the module. Information obtained from the numerical analysis is used to derive design windows on operational and geometric parameters to maximize recovery ratio with constraints on exergetic efficiency. For highest exergetic efficiency, the inlet stream Reynolds number for saline as well as permeate is found to be 300, and the inlet temperature of the saline stream is found to be 363 K while maintaining the permeate temperature at dead state temperature of 298 K.

Keywords: Direct contact membrane distillation (DCMD), Exergy analysis, Exergy destruction, Fiber packing, and Drinking water.

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