

Applications of nanotechnology in membrane distillation: a review study

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ABSTRACT

Membrane distillation (MD) is an effective water treatment process with relatively low cost compared to conventional membrane processes. This study investigates several factors affecting the performance of the MD membrane such as fouling, porosity, pore size, mechanical stability, contact angle, salt rejection, and other physical and thermal properties. Membrane performance can be improved if membranes are manufactured using nanotechnology. This work presents a review of the application of recently discovered nanotechnology that improves the properties and enhances the performance of membranes used in water distillation processes. The use of carbon nanotechnology-based membranes, nanoparticles, metal, and metal oxide nanocomposite is presented and discussed. The use of nanotechnology helps in making membranes less susceptible to fouling and compaction which results in more permeate flux. This study describes the use of scanning electron microscopy as a membrane characterization method and discusses the performance of MD under different operating conditions for the fabricated membranes by using nanotechnology applications. Due to the need for continuous improvement in membrane processes for water distillation and water treatment, the optimization of membrane performance and the parameters affecting this performance should be investigated.

Keywords: Membrane distillation; Nanotechnology; Permeate flux

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