



Hydrophobic surface modification of membrane distillation (MD) membranes using water-repelling polymer based on urethane rubber

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ABSTRACT

Membrane distillation (MD) is a unit process that uses hydrophobic membranes to separate vapor from saline water. The performance of the MD process is largely affected by the properties of the membranes, which should be porous, hydrophobic, and stable under high temperature conditions. Accordingly, it is essential to develop highly efficient membranes for practical implementation of MD technology. In this study, we applied a water repellent chemical (WRC) made of urethane rubber onto hydrophilic membranes to develop a novel approach for MD membrane preparation. A spin coating method was adopted to introduce hydrophobic coating layers on polyamide membranes. Experiments were carried out in the direct contact membrane distillation mode. Contact angle and liquid entry pressure (LEP) were measured before and after the surface coating. In addition, scanning electronic microscope, FT-IR, and atomic force microscope analysis were conducted to confirm a coating layer of the membrane. The optimum condition for the spin coating was 1,500 rpm for 20 s and flux, rejection, and LEP were 6.78 kg/m²-h, 99.9%, and 1.65 bar, respectively. These results confirmed that the membranes prepared by the surface coating of WRC have potential for use in MD process.

Keywords: Water-repelling chemical; Urethane rubber; Membrane distillation; Surface modification; Liquid entry pressure; Flux; Rejection

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