



Preparation and characterization of thin film composite reverse osmosis membranes with wet and dry support layer

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ABSTRACT

The aim of this work is to investigate the effect of initial conditions and properties of a support layer on the performance and structure of a thin film composite (TFC) polyamide membrane. For this purpose, four different polyethersulfone (PES) support layers were prepared and the polyamide layer was coated by interfacial polymerization over these support layers in wet and dry conditions. Surface properties and morphology as well as hydrophilicity of PES support membranes and TFC membranes were examined by atomic force microscopy, field-emission scanning electron microscope, attenuated total reflectance-FTIR, and contact angle analysis, respectively. The results showed that the initial conditions of the support layer had an important role in the performance and surface properties of TFC membranes. The TFC membrane, synthesized over a wet support membrane with larger pore size and more hydrophilicity, had more water flux and lower salt rejection. The effect of wet and dry conditions on the water flux was more significant when a less hydrophilic support layer was used. It was found that the effect of support layer hydrophilicity is more effective than its pore size in wet conditions on water flux of TFC membrane, while a different trend was observed at dry conditions.

Keywords: Thin film composite (TFC); Wet and dry condition; Synthesis; Support layer properties

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