

Effect of manufacture conditions on reverse osmosis desalination performance of polyamide thin film composite membrane and their spiral wound element

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ABSTRACT

Manual operation manufacture line was used to study the performance of flat sheet and spiral wound thin-film composite polyamide-polysulfone reverse osmosis membrane. Continuous flat sheet of porous support layer was manufactured by casting PS solution on nonwoven polyester. Fabrication of TFC flat sheet membrane was achieved through interfacial polymerization of m-phenylenediamine with trimesoyl chloride on the PS support by employing a reaction line. Finally, spiral wound element was manufactured by rolling of the resulted flat sheet membrane. The fabricated flat sheet PA-TFC membranes were characterized using; ATR-FTIR, contact angle, dynamic mechanical analyzer and scanning electron microscope. Performance of the resulted flat sheet and spiral wound membrane element was investigated in terms of water flux and salt rejection using synthesized sodium chloride solution, natural brackish & saline water samples. The effect of operation condition in the casting and coating machines on the performance of the flat sheet membrane was examined. Adoptions of the rolling technique showed significant improvement on the RO performance of the membrane element. Moreover, membrane elements were evaluated for application in water desalination process using natural brackish/saline groundwater or seawater samples.

Keywords: Membrane manufacture; Reverse osmosis; Water desalination; Thin film composite; Spiral wound element

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