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Investigation of pilot scale manufacturing of polysulfone (PSf) membranes by wet phase inversion method

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ABSTRACT

Membranes are used as a support layer for the fabrication of thin film composite membranes. Support layer properties can affect many performance parameters of TFC membranes such as flux, rejection, morphology and stability against pressure. Although studies in lab scale fabrication exist, investigation the pilot scale polysulfone membrane fabrication has not been done. In this study, optimization of polysulfone support membranes fabrication was conducted in pilot scale. Coagulation bath temperature; casting speed and solution content were selected as main parameters for the optimization. Membrane surface properties were investigated in details with SEM and pore size distribution. Membrane performance were determined with permeability experiments. Differences in pilot scale and lab scale membrane manufacturing were observed and compared with literature. On the contrary to literature it was found that, coagulation bath temperature has exact opposite effect in pilot scale membrane formation compared to lab scale studies. 10°C drop (from 25°C to 15°C) in coagulation bath temperature decreased mean pore size of membranes from 27 nm to 8 nm and permeability from 464 l/m²h to 100 l/m²h while everything else was kept constant.

Keywords: Pilot scale membrane production; Sponge-like structure; Non-solvent induced phase separation; RO support layer fabrication; Polysulfone membrane

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