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A novel method to improve flux of nanofiltration composite membrane prepared by interfacial polymerization

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ABSTRACT

Thin film composite (TFC) nanofiltration (NF) membranes based polyamide were prepared with piperazine (PIP) and trimesoyl chloride (TMC) through interfacial polymerization technique on the polysulphone supporting film. The poly(dimethylsiloxane) (PDMS) was added in oil TMC solution to optimize membrane performance. The results showed that compared with the NF membrane without adding PDMS, the NF membrane with adding PDMS had higher water flux (maximum about 2 times); and rejection for PEG200 and NaCl decreased with increase of Molecular weight of PDMS, but Rejection for Na_2SO_4 keep stable. The average roughness (Rq) of NF membrane increased with the molecular weight of PDMS increasing by the AFM results, higher Rq leads to bigger effective area. The best PDMS with molecular weight63000 was obtained. With PDMS63000 content increasing, the molecular weight cut off (MWCO) of NF membrane with PDMS63000 increased from 200Da to 340Da, the flux increased from 40 l/m^2·h to 70 l/m^2·h at 1.0 MPa, while the rejection for Na_2S0_4 unchanged with the concentration of PDMS increasing when PDMS63000 content was less than 0.5%.

Keywords: Poly(piperazineamide); Nanofiltration; Poly(dimethylsiloxane); Thin-film composite membrane; Interfacial polymerization; Molecular weight cut off

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