

Preparation and Characterization of Antifouling Polysulfone Flat Sheet Membrane by Phase Inversion

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Abstract : In this work polymeric Nanofiltration (NF) membranes of polysulfone (PSF) (average molecular weight of 22400 Da) were prepared using polyethylene glycol (PEG) (average molecular weight of 200 Da) as an organic additive and ZnCl₂ as an inorganic additive. Dimethyl acetamide (DMAc) was used as the solvent, and Deionised water as nonsolvent. The membranes were prepared by phase inversion (immersion precipitation) method. PEG 200 and ZnCl₂ in varying concentration are directly added into the casting solution of PSF and DMAc. PEG 200 was used in concentration varying from 0 to 10 % (w/w) in the solution of PSF and DMAc, while ZnCl₂ is varied from 0 to 2% (w/w). Membranes were characterized for surface morphology, water uptake, porosity and contact angle, with respect to concentration of PEG and ZnCl₂. It was observed that with the increase in additive PEG 200, the porosity and hence, hydrophilicity increase. As a result, the number of pores increases as justified by the SEM analysis as well. The study revealed that the synergistic effect of PEG with ZnCl₂ is more effective, and the best results were produced by the solution containing 2% PEG 200 and 1% ZnCl₂. It was inferred that with the increase in concentration of additives, the pore size goes on decreasing. The membranes obtained gradually move from microfiltration range to nanofiltration range, and this change is primarily brought about by the addition of ZnCl₂.

Keywords : membrane, phase inversion method, polysulfone, porous structure

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