

Abstract

In this work, poly(phenyl sulfone) (PPSU) membranes were prepared by diffusion-induced phase inversion method in N-methyl-pyrrolidone using different concentrations of ZnO nanoparticles as additives. The main objective of this work is to evaluate the performance of the PPSU membranes with ZnO nanoparticles. The concentrations of ZnO were 0, 0.01, 0.015, 0.02, 0.025, and 0.03 wt.%. The effect of the ZnO nanoparticles on the characteristics of PPSU membranes was investigated with scanning electron microscopy and atomic force microscopy observations, contact angle measurement, nanofiltration experiments, and observations of solute rejection. It was found that the cross-section structure of the membrane changes from a finger-like and sponge-like structure formed near the support and top layers, respectively, to fully sponge-like structure with increase of ZnO concentration up to 0.025 wt.%. The mean pore size and mean roughness of the PPSU/ZnO membranes increased with the ZnO concentration. The membrane hydrophilicity increases due to the addition of ZnO nanoparticles. The flux of the PPSU membranes with 0.025 wt.% ZnO as additives enhanced from 76 to 107 (Lm²h⁻¹bar⁻¹) with no significant change in solute rejection.