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Synthesis and characterization of styrene-acrylonitrile copolymer blend ultrafiltration membranes

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ABSTRACT

Polymeric blend new ultrafiltration membranes based on chemically and thermally stable styrene based copolymer were prepared by blending the styrene acrylonitrile copolymer (SAN) with cellulose acetate (CA) in N,N-dimethyl formamide (DMF) as polar solvent. Flat sheet asymmetric ultrafiltration CA/SAN blend membranes were fabricated using a suitable combination of solvent (DMF), non-solvent (water) both in the presence and absence of different additive concentrations, polyethylene glycol (PEG 600), by phase inversion technique. The performance of the new membrane material developed was investigated in terms of pure water flux, water content and membrane resistance. The surface and cross sectional morphologies of the membrane material were analyzed using scanning electron microscopy (SEM). Macromolecules such as pepsin, trypsin, egg albumin and bovine serum albumin were used as solutes in order to quantify the efficiency of protein separation of different blend membranes. The molecular weight cut-off (MWCO) and product rate efficiencies of the prepared membranes were also estimated. The effects of various polymer blend compositions and various additive concentrations on the above characteristics were analyzed in comparison with pure cellulose acetate membranes. The experimental results of the present work revealed that the CA/SAN blend membranes in the presence of additive have higher flux behavior than that of the membranes prepared from pure CA polymer.

Keywords: Cellulose acetate; Styrene acrylonitrile copolymer; Protein rejection; Molecular weight cut-off; Pore size

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