Abstract

A steam/dry/wet phase inversion method was used to fabricate hollow-fiber membranes for ultrafiltration (UF) applications from polyethersulfone (PES) as a polymer material, gamma butyrolactone (GBL) as a solvent and polyethylene glycols (PEGs) as a pore-former additive. Pure water, 30 wt.% ethanol and 30 wt.% isopropanol were used as borefluids. The effect of PEG concentration, type of borefluid, and borefluidflow rate (BFR) onthe structure, permeability, separation performance and mechanical properties of PES hollowfiber was studied.The PES hollow-fiber membranes were characterized by scanning electron microscopy (SEM), capillaryflowporometer and porosity measurement. From the results it was found that all PES hollowfibers have a sponge-like structure in the cross-sectional area. Using 30% ethanol as a borefluid producedfiber with pore densityhigher than that produced using water or 30% isopropanol. With an increase of the borefluid rate from 7.67 to23.06 g/min, the pore density and the PWP increased from 14,698.6 to 29,440.2 (pores/mm2×102) and from45.2 to 107.4 l/m2·h·bar respectively, with a minor change in protein rejection. The mechanical properties in terms of Young's modulus, tensile strength and elongation at break were dependent on PEG concentration,and borefluid type and concentration.