Abstract

Polyethersulfone hollow fiber membranes were prepared by the dry/wet spinning technique under different gas gaps, namely, air, oxygen,nitrogen, carbon dioxide and argon. All spinning parameters were maintained the same. The effects of the gas type on the morphological properties of the hollow fibers were studied in terms of atomic force microscopy and solute transport using ultrafiltration of the non-ionic solutes; i.e.polyethylene glycol and polyethylene oxide of different molecular weights. Pore size, nodule size and roughness parameters of both the internaland external hollow fiber surfaces were determined by atomic force microscopy. Pure water permeation, performance ratio, mean pore size, poresize distribution, pore density, porosity and molecular weight cut off were obtained from solute transport analysis. The studied polyethersulfonehollow fiber membranes could be divided into two groups. A group of hollow fibers prepared under gases exhibiting higher molecular mass andlower thermal conductivity like carbon dioxide and argon and a group of hollow fibers prepared under the other gases (air, oxygen and nitrogen)having lower molecular mass and higher thermal conductivity. Hollow fiber membranes prepared under gas gap type having high molecular massand low thermal conductivity exhibit greater pore size, nodule size and roughness of the external surface than the other fiber membranes, whereas no significant change was detected in the structural parameters of the internal surface of all prepared hollow fibers. Differences in hollow fibermembrane permeability and separation performance were also observed depending on the gas type used.