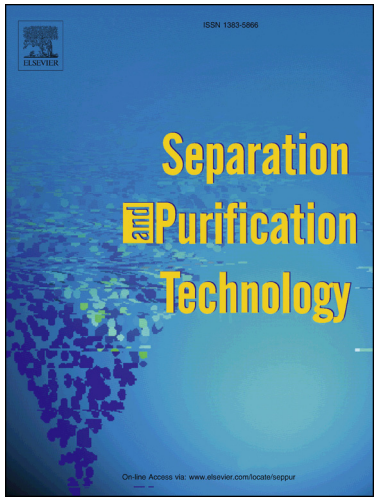

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Block copolyimide membranes for pure- and mixed- gas separation

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Abstract

A series of aromatic random and multiblock co-polyimides with varying block length was prepared from 2,2'-bis-(3,4-dicarboxyphenyl) hexafluoropropane dianhydride with *m*-phenylenediamine (6FDA-mPDA) and 2,3,5,6-tetramethyl-1,4-phenylenediamine (6FDA-durene). The permeability coefficients of pure gases (CO_2, CH_4, N_2, He, O_2, and H_2) through the multiblock co-polyimide (6FDA-mPDA)-(6FDA-durene) membrane measured at various feed pressure (100 – 300 psi) and temperature (35^o C) were studied. The temperature dependence of permeabilities was also investigated over the permeation test range of 35-55 ^{o}C at 200 psi upstream pressure. The permeability properties of quaternary gas mixtures consisting of 10, 59, 30 and 1 vol% CO_2, CH_4, N_2 and C_2H_6 respectively through the membrane were investigated at various feed pressures. In pure gas studies, permeability coefficients of all the penetrants stay relatively constant with increasing pressure. Different behaviour was however exhibited in the quaternary gas mixture studies as the permeability values of CO_2 decrease with increasing feed pressure, whereas those of CH_4, N_2, C_2H_6 increase with increasing feed pressure. Unlike the pure gas studies that show constant CO_2/CH_4 and N_2/CH_4 selectivity values as a function of the feed pressure, the mixed gas studies did show some efficiency losses through a decrease of both CO_2/CH_4 and N_2/CH_4 selectivity. However C_2H_6/CH_4 separation factor increases rapidly as the feed pressure is further increased.

Keywords: multiblock co-polymers; membranes; gas separation; permeability; selectivity.