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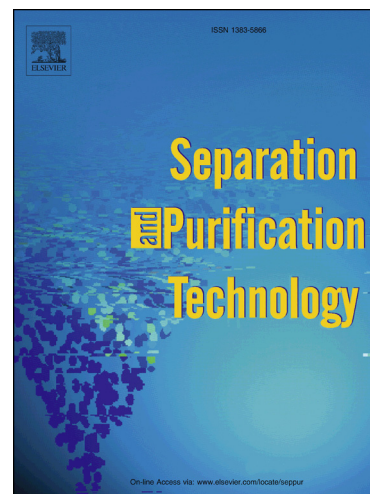
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Block copolyimide membranes for pure- and mixed- gas separation

R. Heck^a, Mohammad S. Qahtani^b, Garba O. Yahaya^b, I. Tanis^c, D. Brown^c, Ahmad A. Bahamdan^b, Ahmad W. Ameen^b, M. M. Vaidya^b, J-P. R. Ballaguet^b, R. H. Alhajry^b, E. Espuche^{a,*}, R. Mercier^{a,*}

^a Ingénierie des Matériaux Polymères, UMR5223 CNRS/Université de Lyon, Université Lyon 1, 69622 Villeurbanne, France

^b Research & Development Center, P.O. Box 62, Saudi Aramco, Dhahran 31311, Saudi Arabia

^c LEPMI, Université de Savoie, 73000 Chambéry, France

* to whom correspondence should be addressed

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 (CO₂, CH₄, N₂, He, O₂, and H₂) through the multiblock co-polyimide (6FDA-mPDA)-(6FDA-durene) membrane measured at various feed pressure (100 – 300 psi) and temperature (35° C) were studied. The temperature dependence of permeabilities was also investigated over the permeation test range of 35-55 °C at 200 psi upstream pressure. The permeability properties of quaternary gas mixtures consisting of 10, 59, 30 and 1 vol% CO₂, CH₄, N₂ and C₂H₆ 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 CO₂ decrease with increasing feed pressure, whereas those of CH₄, N₂, C₂H₆ increase with increasing feed pressure. Unlike the pure gas studies that show constant CO₂/CH₄ and N₂/CH₄ selectivity values as a function of the feed pressure, the mixed gas studies did show some efficiency losses through a decrease of both CO₂/CH₄ and N₂/CH₄ selectivity. However C₂H₆/CH₄ separation factor increases rapidly as the feed pressure is further increased.

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

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