

Publication Abstracts – Materials & Membrane Development

I. Pinnau and Z. He, "Pure- and Mixed-Gas Permeation Properties of Polydimethylsiloxane for Hydrocarbon/Methane and Hydrocarbon/Hydrogen Separation," J. Membr. Sci. 244, 227-233 (2004).

This paper reports binary and multi-component mixture permeation properties of dense, isotropic PDMS films as a function of feed composition and temperature for the separation of higher hydrocarbons from methane or hydrogen. An increase in the feed concentration of hydrocarbon vapors at constant feed pressure and temperature leads to an increase in gas permeability of all mixture components. The increase in permeability is caused by vapor-induced swelling of the polymer, which leads to higher diffusion coefficients of all penetrants. Vapor-induced swelling of polymer membranes that selectively permeate a vapor or gas over a smaller penetrant will lead to improvements in both permeability and selectivity. Industrial separations where swelling of rubbery polymers in multi-component mixtures can positively affect membrane performance include: VOC/air; methane/hydrogen; methane/nitrogen; and carbon dioxide/ hydrogen.