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Pervaporation of Methanol/Methyl-t-Butyl Ether Mixtures Through Poly(Vinyl Alcohol)/Poly(Acrylic Acid) Blend Membranes

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Abstract: Membranes obtained by blending poly(vinyl alcohol) (PVOH) and poly(acrylic acid) (PAA) have been investigated for the separation of methanol and methyl-t-butyl ether (MTBE) liquid mixtures through a pervaporation process. Experiments were performed by contacting one side of a polymer dense film with the liquid mixture and removing the vapor on the other side with an inert gas flux, a setup for a process with sweeping gas. The blend membranes, with a COOH/OH ratio in the 0.5–2.5 range, are permeated by methanol preferentially. Higher values of flux and lower values of selectivity are observed when the methanol content in the feed increases. The ratio PAA/PVOH of the membrane influences both flux and selectivity in the same way. A maximum of both flux and selectivity is observed at a COOH/OH ratio of about 2. The swelling of membranes of different composition in the presence of different liquid composition explains the flux behavior in the pervaporation experiments. The observed membrane swelling has been explained on the basis of the solubility parameters of the components of the system.

Keywords: Pervaporation, methanol, MTBE, poly(vinyl alcohol), poly(acrylic acid), blend membranes, swelling

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