

Properties of amino-functionalized silica membranes for the dehydration of water/ethanol mixtures

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ABSTRACT

Amino-functionalized silica membranes were applied to the separation of water/ethanol mixtures by pervaporation. An increased interaction between the silica membrane surface and permeating materials is important in order to enhance separation. In this study, the improvement in water permeance ability and selectivity was examined by modifying the silica membrane surface with amino groups. Silica membranes were prepared by the sol-gel method of hydrolysis and cocondensation processes using tetraethoxysilane (TEOS) as a silica source and 3-aminopropyltriethoxysilane (APTES) to introduce the amino groups. The performance of membranes prepared with various molar ratios of TEOS/APTES was evaluated by pervaporation of water/ethanol. The separation property of the amino-functionalized membrane was higher than that of a membrane prepared with TEOS. The membranes were characterized by FE-SEM, FT-IR and single gas permeation measurements of He and N₂.

Keywords: Pervaporation; Silica membrane; Amino group; Hydrophilicity; Dehydration

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