386e Synthetic Sulfonated Polyimide Membranes for Dehydration of Isopropanol

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Isopropanol is a common chemical used as a solvent in many industrial fields. In its production processes, pervaporation dehydration is a promising alternative refining method. In this work, homogeneous sulfonated polyimide membranes were prepared, and their dehydration properties were measured at different temperatures and for aqueous isopropanol solutions of different concentrations. Polyimides of different sulfonation degrees were synthesized from one-step polycondensation of 4,4'-(hexafluoroisopropylidene)diphthalic anhydride (6FDA), 4-aminophenyl ether (ODA), and 2,4-diaminobenzenesulfonic acid (DBSA) in *m*-cresol. Homogenous membranes of 7-15 μm in thickness were prepared from their tetrahydrofuran solutions. Azeotropic aqueous solutions were used as feed in pervaporation experiments from 30 to 70 °C. The highest permeation flux is 0.72 kg/m^2·h with the separation factor 64.5 for 6FDA-ODA-DBSA(10:8:2) at 70 °C, and the highest separation factor is 223.7 with the permeation flux 0.22 kg/m^2·h for 6FDA-ODA-DBSA(10:6:4) at 50 °C. At 60 °C, feed solutions of different concentrations 10 – 50 w/w % were also used. 6FDA-ODA-DBSA(10:7:3) has the highest permeation flux 0.714 kg/m^2·h with a separation factor of 24.1 for the 50 w/w % feed solution, and 6FDA-ODA-DBSA(10:6:4) has the highest separation factor 240.6 with a permeation flux of 0.21 kg/m^2·h for the 10 w/w % feed solution.