

Gas permeation properties of cellulose acetate films on fine paper support

문준모, 류원선[†]

홍익대학교

(wsryoo@hongik.ac.kr[†])

Composite membranes with cellulose acetate (CA) dense skins on fine paper support were prepared by spin-coating from cyclohexanone solution. The spin speed ranged from 800 to 2400 rpm, and the concentration from 1 to 4 wt%. Prepared membranes were dried at 75 °C in a vacuum oven for 1 hr. The morphology of membranes was studied by SEM, and the thickness of polymer skin layers observed from a few hundred nanometers to a micrometer depending on polymer concentration and spin speed. The gas separation performance of membranes was evaluated by permeation measurements on pure gases of methane, hydrogen, and carbon dioxide and their 50:50 mixtures under 35 °C. The permeance of the pure gases were 330 GPU for CO₂, 550 for CH₄ and 1460 for H₂ with 230 nm skin layers of CA. The ideal selectivity was 2.69 for the mixture of H₂/CH₄ and 1.61 for that of CH₄/CO₂ while the real selectivity decreased to 1.05 for H₂/CH₄ and to 1.19 for CH₄/CO₂, respectively. However, The real selectivity increased to 1.67 for H₂/CH₄ as the CA thickness increased to 930 nm, while the ideal selectivity decreased to 2.52 and the permeance of pure gases decreased to 40.8 for H₂ and 16.2 for CH₄.