

Pervaporation of Dimethyl Carbonate / Methanol / Water Mixtures Using Zeolite Membranes

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Abstract : A novel membrane reactor process for DMC synthesis from carbon dioxide has been developing in Korea Institute of Energy Research. The scheme of direct synthesis of DMC from CO₂ and Methanol is 'CO₂ + 2MeOH ⇌ DMC + H₂O'. Among them, reactants are CO₂ and MeOH, product is DMC, and byproduct is H₂O (water). According to Le Chatelier's principle, removing byproduct (water) can shift the reaction equilibrium to the right (DMC production). The main purpose of this process is removing water during the reaction. For efficient in situ water removal (dehydration) and DMC separation, zeolite 4A membranes with very small pore diameter and hydrophilicity were introduced. In this study, pervaporation performances of binary and ternary DMC / methanol / water mixtures were evaluated.

Keywords : dimethyl carbonate, methanol, water, zeolite membrane, pervaporation

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