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

Authors : Jong-Ho Moon, Dong-Ho Lee, Hyunuk Kim, Young Cheol Park, Jong-Seop Lee, Jae-deok Jeon, Hyung-Keun Lee 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 CO_2 and Methanol is $'CO_2 + 2MeOH \leftrightarrow DMC + H_2O'$. Among them, reactants are CO_2 and MeOH, product is DMC, and byproduct is H_2O (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 : dimehtyl carbonate, methanol, water, zeolite membrane, pervaporation

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