

Development of Continuous DMC Synthesis Process Using Adsorptive Cu-Based Catalysts

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The synthesis of dimethyl carbonate by vapor phase oxidative carbonylation of methanol was studied under continuous reactor (fixed bed) and batch reaction (autoclave) systems. The goal of this work was to establish the effects of anions containing copper compound and pore structure of catalytic supports. In this study, CuCl and CuCl₂ were used as sources of Cu⁺ or Cu²⁺ ions. Aluminas, zeolites, MOFs were introduced as adsorptive and catalytic supports. The catalytic reaction was carried out at various temperature (423–523 K) and pressure (0.1–2.5 MPa) conditions with fixed bed reactor. The obtained vapor mixture with DMC, MeOH, CO and O₂ were analyzed by an on-line GC (GC6890 with 6 port valve system) equipped with a flame ionization detector (FID). The condensed liquid was also collected and analyzed by same GC with auto injecting system to confirm the DMC formation in the reaction system. The optical, physical, and chemical characteristics of synthesized catalysts were analyzed using BET, XRD, SEM, EDX, and TGA before and after breakthrough tests.