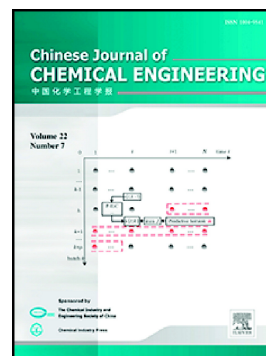


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*Catalysis, kinetics and reaction engineering*

# Influence of Dehydrating Agents on the Oxidative Carbonylation of Methanol for Dimethyl Carbonate Synthesis over a Cu/Y-Zeolite Catalyst

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## Abstract

The influence of the dehydration by metal oxides on the synthesis of dimethyl carbonate (DMC) *via* oxidative carbonylation of methanol was studied. A Cu/Y-zeolite catalyst was prepared by the ion exchange method from CuCl<sub>2</sub>·2H<sub>2</sub>O and the commercial NH<sub>4</sub>-form of the Y type zeolite. The catalyst was characterized by X-ray fluorescence (XRF), N<sub>2</sub> adsorption (BET method), X-ray diffraction (XRD), and temperature-programmed desorption of ammonia (NH<sub>3</sub>-TPD) to evaluate its Cu and Cl content, surface area, structure, and acidity. Reaction tests were carried out using an autoclave (batch reactor) for 18 h at 403 K and 5.5 MPa ( $2\text{CH}_3\text{OH} + 1/2\text{O}_2 + \text{CO} \rightarrow (\text{CH}_3\text{O})_2\text{CO} + \text{H}_2\text{O}$ ). The influence of various dehydrating agents (ZnO, MgO, and CaO) was examined with the aim of increasing the methanol conversion ( $X_{\text{MeOH}}$ , MeOH conversion). The MeOH conversion increased upon addition of metal oxides in the order CaO >> MgO > ZnO, with the DMC selectivity ( $S_{\text{DMC}}$ ) following the order MgO > CaO > ZnO. The catalysts and dehydrating agents were characterized before and after the oxidative carbonylation of methanol by thermogravimetric and differential thermogravimetric (TG/DTG), and XRD to confirm that the dehydration reaction occurred *via* the

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