# Accepted Manuscript


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

Dong-Ho Lee, Jiin You, Je-Min Woo, Jung Yoon Seo, Young Cheol Park, Jong-Seop Lee, Hyunuk Kim, Jong-Ho Moon, Seung Bin Park

PII: S1004-9541(17)31399-X
DOI: doi:10.1016/j.cjche.2018.02.018
Reference: CJCHE 1058

To appear in:

Received date: 19 October 2017
Revised date: 19 January 2018
Accepted date: 20 February 2018

Please cite this article as: Dong-Ho Lee, Jiin You, Je-Min Woo, Jung Yoon Seo, Young Cheol Park, Jong-Seop Lee, Hyunuk Kim, Jong-Ho Moon, Seung Bin Park , Influence of Dehydrating Agents on the Oxidative Carbonylation of Methanol for Dimethyl Carbonate Synthesis over a Cu/Y-Zeolite Catalyst. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Cjche(2018), doi:10.1016/j.cjche.2018.02.018

*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

Dong-Ho Lee[1,3], Jiin You[1], Je-Min Woo[1], Jung Yoon Seo[1], Young Cheol Park[1], Jong-Seop Lee[1], Hyunuk Kim[2], Jong-Ho Moon[1,*] and Seung Bin Park[3,*]

[1] Greenhouse Gas Laboratory, Korea Institute of Energy Research, 152 Gajeong-ro, Yuseong-gu, Daejeon, 34129, Korea

[2] Energy Material Laboratory, Korea Institute of Energy Research, 152 Gajeong-ro, Yuseong-gu, Daejeon, 34129, Korea

[3] Department of Chemical and Biomolecular Engineering, Korea Advanced Institute of Science and Technology, 291 Daehak-ro, Yuseong-gu, Daejeon, 34141, Korea

* Corresponding authors. E-mail address: moon_jongho@kier.re.kr; SeungBinPark@kaist.ac.kr



## 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 $CuCl_2 \cdot 2H_2O$ and the commercial $NH_4$-form of the Y type zeolite. The catalyst was characterized by X-ray fluorescence (XRF), $N_2$ adsorption (BET method), X-ray diffraction (XRD), and temperature-programmed desorption of ammonia ($NH_3$-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 ($2CH_3OH + 1/2O_2 + CO \rightarrow (CH_3O)_2CO + H_2O$). The influence of various dehydrating agents (ZnO, MgO, and CaO) was examined with the aim of increasing the methanol conversion ($X_{MeOH}$, MeOH conversion). The MeOH conversion increased upon addition of metal oxides in the order CaO >> MgO > ZnO, with the DMC selectivity ($S_{DMC}$) 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