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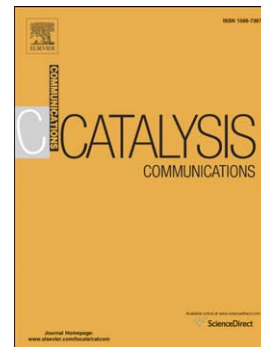
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The role of zinc oxide in carbonylation of ethylene glycol to ethylene carbonate
with urea: a precursor for homogenous catalyst

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Abstract

In carbonylation of ethylene glycol to ethylene carbonate with urea catalyzed by ZnO, which was considered as a heterogeneous catalyst. ZnO is observed to be dissolved in the reactants probably due to the formation of $\text{Zn}(\text{NCO})_2(\text{NH}_3)_2$ making the reaction homogeneously catalyzed. To our knowledge, it is firstly reported that the reaction experienced three states including ZnO dissolution, homogeneous catalysis, and precipitate formation. The precipitate was characterized to be a mixture containing $\text{Zn}(\text{OH})_2$, ZnCO_3 , and $\text{Zn}(\text{NCO})_2$ with a ratio of 8.5: 6.1: 1. Possible mechanisms of ZnO dissolution and precipitation were proposed.

Keywords: ZnO; Homogeneous catalysis; Urea; Ethylene glycol; Ethylene carbonate

1. Introduction

Ethylene carbonate (EC) is a commercially important starting chemical or intermediate for selective alkoxylation, carbamate formation, the processing agents of

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