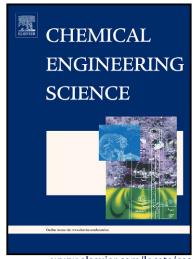
## Author's Accepted Manuscript

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www.elsevier.com/locate/ces

PII: \$0009-2509(13)00620-9

DOI: http://dx.doi.org/10.1016/j.ces.2013.09.007

Reference: CES11288

To appear in: Chemical Engineering Science

Received date: 5 April 2013 Revised date: 28 August 2013 Accepted date: 2 September 2013

Cite this article as: Johannes Holtbruegge, Mathias Leimbrink, Philip Lutze, Andrzej Górak, Synthesis of Dimethyl Carbonate and Propylene Glycol by Transesterification of Propylene Carbonate with Methanol: Catalyst Screening, Chemical Equilibrium and Reaction Kinetics, Chemical Engineering Science, http: //dx.doi.org/10.1016/j.ces.2013.09.007

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### ACCEPTED MANUSCRIPT

Synthesis of Dimethyl Carbonate and Propylene Glycol by Transesterification of Propylene Carbonate with Methanol: Catalyst Screening, Chemical Equilibrium and Reaction Kinetics

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#### 1. Abstract

This paper investigates the transesterification of propylene carbonate with methanol to form dimethyl carbonate and propylene glycol in preparation for integrating this reaction into a reactive distillation column. The investigation of suitable catalysts matching the operating window of a reactive distillation column is essential to design a feasible process. Hence, a screening of nine heterogeneous and two homogeneous catalysts to identify a suited catalyst for this reaction is presented. Afterwards, the chemical equilibrium and reaction kinetics are investigated using an experimental and theoretical approach. Molar- and activity-based chemical equilibrium constants were determined from the experimental results, and their temperature dependency was described using the van't Hoff equation. The reaction kinetics were measured using the homogeneous catalyst sodium methoxide to enhance the reaction rate. The theoretical description of the reaction kinetics was established using an activity-based approach to account for the non-ideal thermodynamic liquid-phase behavior. The well-known Arrhenius equation was used to describe the temperature dependency of the reaction rate constant.

Keywords: batch reactor, heterogeneous catalyst, homogeneous catalyst, reaction kinetics modeling, reactive distillation, sodium methoxide

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