

The Effect of Co-Cations on the Catalytic Performance of Ni Based Catalysts for Butene Dimerization

A. Ehrmaier*, L. Löbbert*, Y. Liu*, M. Sanchez-Sanchez*, R. Bermejo-Deval*, S. Peitz**,
G. Stochniol**, J. A. Lercher*

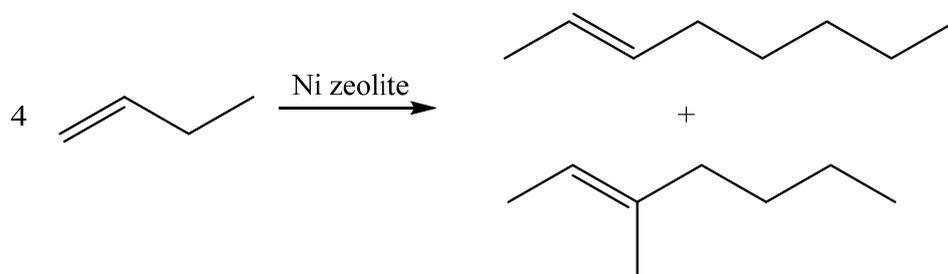
*TU München, Lehrstuhl II für Technische Chemie, Department Chemie, Catalysis Research Center, Garching, Germany, **Evonik Performance Materials GmbH, Marl, Germany

Abstract

Introduction. Butene is a side product in several cracking processes. Its alkylation towards highly branched octenes is a prominent industrial method to produce gasoline additives. In the last decades, linear and monobranched octenes generated from butene dimerization have attracted growing attention as reactants for the synthesis of PVC plasticizers.^{1,2} In this work, Ni-loaded zeolites of defined pore size and crystalline structure are explored as selective catalysts for 1-butene dimerization. Different cations are introduced into the structure to investigate their influences on the catalyst's selectivity and activity.

Experimental Procedure. Ni-zeolite catalysts are prepared by ion exchange with an aqueous solution of nickel nitrate with subsequent calcination. Their catalytic activity in butene dimerization is tested in a plug flow reactor. The product stream is hydrogenated over a Pt catalyst and the resulting alkanes are analyzed by an online GC in order to determine the degree of oligomerization and selectivity to linear octenes.

Results and Discussion. The synthesized zeolite based nickel catalysts are able to catalyze the conversion of 1-butene to linear and monobranched octenes. Thereby it can be observed that the cations being present in the system significantly influence conversion rate and the octene isomer distribution. This is a consequence of both the electronic influence of the cations on the nickel centers and the steric accessibility of the nickel active sites.



¹B. Nkosi, F. T. T. Ng, G. L. Rempel, Applied Catalysis A: General 1997, 161, 153-166.

²S. Albrecht, D. Kießling, G. Wendt, D. Maschmeyer, F. Nierlich, Chemie Ingenieur Technik 2005, 77, 695-709.