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Propylene Dimerization Over Nickel-Ion Exchanged Zeolites in the Liquid Phase

of

Mina K. MUNSHIEVA

Chemistry

Institute of Inorganic and Physical Chemistry, Azerbaijan National
Academy of Sciences, 370143, Baku, Azerbaijan Republic,
29 H. Javid, Avenue-AZERBAIJAN

 [Keywords](#)
 [Authors](#)



chem@tubitak.gov.tr

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Abstract: The possibility of the dimerization of propylene in the liquid phase over nickel-ion exchanged zeolites (Ni-zeolites) modified by treatment with AlEt_2Cl to provide enhanced activity is studied. In order to determine the influence of the crystalline structure of zeolites on their catalytic activity and the selection of the most active catalyst the zeolites of faujasite (NaX, NaY), erylone and mordenite types with various structures and different cell sizes have been chosen. The samples of Ni-zeolites were prepared by ion exchange with nickel nitrate in a corresponding zeolite. The treatment of these zeolites with AlEt_2Cl leads to the formation of active dimerization of propylene catalytic systems. The activity of these systems reaches the maximum at an Al/Ni weight ratio approximately equal to 10. It is assumed that the mechanism of propylene dimerization in the investigated catalysts is similar to the mechanism of olefin dimerization in Ziegler-Natta catalytic systems. The ESR results suggests Ni-ion participation in the formation of catalytically active species. The distinctions in the catalytic behaviour of the studied zeolites are connected with their crystalline structure. It is probable that the dimerization process over Ni-zeolites of faujasite type goes on in the kinetic area, while in the case of Ni-erylone and Ni-mordenite, diffusional breaking, which decreases an activity of these catalysts, takes place. The diffractographic investigation demonstrates a partial destruction of the crystalline structure of zeolite after the repeated treatment with AlEt_2Cl . The preservation of the crystalline structure from full decay presumably is the consequence of the exchanged reaction between the Ni-ion and proton - product of the interaction of Ni-zeolite with AlEt_2Cl .

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