507a Competitive Adsorption of 1,5-, 1,6- and 2,6-Dimethylnaphthalene on Various Ion-Exchanged Faujasite Zeolites

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Selective separation of 2,6-dimethylnaphthalene (DMN), a starting material for high performance engineering plastics and liquid crystal polymers production, from its isomeric mixtures has drawn attention from many researchers. Production of 2,6-DMN from isomerization of 1,5-DMN is limited by thermodynamic equilibrium with 48%, 42%, and 10%wt of 2,6-DMN, 1,6-DMN and, 1,5-DMN, respectively. Some studies have been reported on 2,6-DMN separation using ion-exchanged faujasite zeolites, but they did not emphasize on the competitive adsorption that actually proceeds during the 2,6-DMN purification. Since a large scale production of 2,6-DMN has been recently claimed using the isomerization of 1,5-DMN to 2,6-DMN, competitive adsorption study of the acquired DMN mixture from the process is even more important and was conducted in this study. Competitive adsorptions were carried out for a mixture of 1,5-, 1,6- and 2,6-DMN with its thermodynamic equilibrium composition of 1,5-DMN isomerization over various ion-exchanged faujasite zeolites using n-paraffins as solvent and tracer at 25^{o}C. Adsorption of each species over the zeolites was estimated and discussed in terms of quantity and selectivity. Langmuir and Freundlich models were utilized to fit the ternary equilibrium adsorption data. In addition, experiments with the pulse test and breakthrough technique were also carried out to further understand and verify the competitive adsorption isotherm. Based on the experimental results, possibility of using reactive adsorption to enhance the 2,6-DMN production will be assessed and presented.