Catalytic Transformation Of C-7-C9 Methyl Benzenes Over USY-Based FCC Zeolite Catalyst

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Summary

Catalytic transformation of three methyl benzenes (toluene, m-xylene, and 1,2,4-trimethylbenzene) has been investigated over USY-based FCC zeolite catalyst in a novel Riser Simulator at different operating conditions. The effect of reaction conditions on the variation of isomerization to disproportionation products ratio (I/D), distribution of trimethylbenzene (TMB) isomers (1,3,5-to-1,2,3-) and values of p-xylene/o-xylene (P/O) ratios are reported. The sequence of reactivity of the three alkyl benzenes was found to decrease as the number of methyl group per benzene ring decreases, as follows: 1,2,4-trimethylbenzene > m-xylene > toluene. This is true at all temperatures investigated over the USY zeolite. Toluene was found unreactive in our reaction condition. Effectiveness factor (eta(ss)) of both 1,2,4-TMB and m-xylene have been estimated. While m-xylene's eta(ss) was close to unity at all condition, 1,2,4-TMB's eta(ss) was less than that of m-xylene. The effectiveness factor was estimated from the quasi-steady state approximation modeling of the experimental data involving a decay function based on 'Time on Stream' (TOS). Based on the present study, it was found that the number of methyl groups has the most important role on the reactivity of 1,2,4-TMB, m-xylene and toluene over Y-based catalyst. (c) 2006 Elsevier B.V. All rights reserved.

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