



Application of Na₃PO₄/NaX catalyst for the side chain alkylation reaction of toluene with methanol

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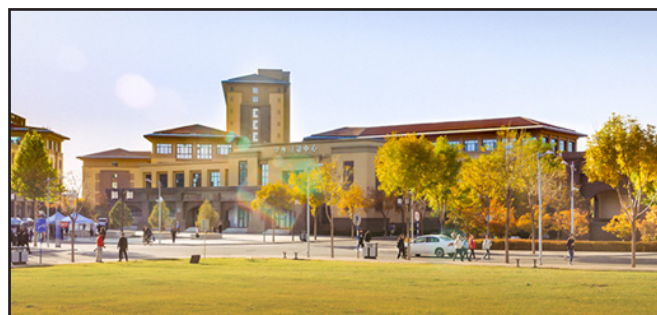
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Abstract:

Styrene is a basic organic chemical raw material for synthetic rubber and plastics. At present, there are many ways to synthesize styrene in industry, but most of them are catalytic dehydrogenation of ethylbenzene. This process has many shortcomings such as long process and high energy consumption, which are not in line with the current concept of environmental protection and energy saving. The side-chain alkylation of toluene with methanol has many advantages, such as wide source of raw materials, short process flow, low energy consumption. Therefore, this reaction has become the focus of research. A large number of studies have found that side-chain alkylation of toluene with methanol is a synergistic reaction on acid and base catalyst, and the catalyst needs to have suitable weak acid sites and base sites at the same time. In our recent research we found that moderate addition of cheaper Na₃PO₄ decreased the amount of middle acid and increased the strength and amount of middle base sites. Based on the unique role of Na₃PO₄ in regulating acidity and basicity, catalysts with different acidity and basicity were prepared in this paper and the relationship between the catalytic performance and the distribution of acid and base sites were investigated. The catalysts were characterized by XRD, SEM, FT-IR, BET, UV-Vis, NH₃-TPD and CO₂-TPD. It is found that the catalysts prepared by ion-exchange of Na₃PO₄ solution with NaX zeolite, the distribution of the acid-base sites changes with the concentration of Na₃PO₄ solution. While the catalyst prepared by a modified method which cannot be opened at present has a better performance for the side chain alkylation of toluene with methanol. The reason is that Na₃PO₄ and NaX can provide a suitable base site, a weak acid sites respectively and they both form a suitable space structure required for the reaction. The reaction of toluene and methanol were very sensitive to the basicity and acidity of the catalyst, there were some competitive activations for toluene and methanol over middle acid and middle base sites.

Biography:

Faraz Ahmad is currently doing MS in Chemical Engineering from School of Chemistry and Chemical Engineering, Taiyuan University of Technology, Taiyuan, Shanxi, Peoples Republic of China. Faraz is working as research assistant in Key Laboratory of Coal Science and Technology of Ministry of Education and



Shanxi Province. His research topic is “Production of styrene and ethylbenzene by side chain alkylation of toluene with methanol”. Specifically his expertise are in the following area: catalyst preparation, characterization of catalyst. Previously in his BS he has done a research project entitled “Production of Methanol from Coal”. Apart from educational career he has two years of teaching experience in a reputable HEC recognized University in Pakistan.

Publication of speakers:

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