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Zeolite catalystsfor n-butane isomerization working at low temperatures

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Production of branched paraffins is the major task ofthe petrochemical industry, which forms the basis formanufacturing various alkylates and oxygenates. In spite of the fact that isomerization of n-paraffins inthe liquid phase is thermodynamically favored, isomerization in the vapor phase over heterogeneous catalysts is considered a promising process. Although the application of such catalysts requires high temperatures, their use makes it possible to simplify the flow diagram and facilitates the selectivity of theprocess. The isomerization of n-butane is carried out in theindustry mainly over the chlorine-promoted alumina–platinum catalysts. However, these catalysts have shortcomings, such as high sensitivity to feedstock purity and environmental unfriendliness due the presence of chlorine compounds. Metal–zeolite catalysts are free of these shortcomings; however, theyexhibit isomerizing activity at higher temperatures (280-370^{0}C) and,therefore, are preferable for isomerization of C5–C6 paraffins. One of the necessary conditions for the application of zeolites to n-butane isomerization isenhancement of their activity by selected effectivemodifiers and running the reaction at lower temperatures.A simple and convenient method of preparation of modified zeolites by impregnation of dealuminatedmordenite with zirconium saltssolutions or solvent free mixing with subsequent thermal processing is proposed. Zirconiaexerts a promoting action on the catalytic properties of dealuminatedmordeniterising itsactivity at low temperatures. Sulfation of mordenite-zirconia catalysts leads to the still moreincreasing of their activity and decrease of the reaction temperature to 190-210^{0}C and a pressure of 0.1MPa. It can be supposed that the modifying effect of zirconia and sulfat ions is connected with change of force and concentration of acid centers, and the other hand, with optimization of zeolite microporous structure.

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