ABSTRACT OF THE DOCTORAL DISSERTATION

Hydroisomerization of n-alkanes over hierarchical-pore catalysts.

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Doctoral thesis deals with research on hydroconversion of *n*-alkanes. The aim of the dissertation was to develop a micro-mesoporous catalyst support (containing AlSBA-15 and zeolite), characterized with a high activity in *n*-C_7 and *n*-C_{16} conversion processes and high selectivity towards isomer products.

In this work consideration was given to: biporous materials synthesis, their shaping and preparation *via* dry impregnation with aqueous solutions of Pt and Pd. Structural properties, metal and acid function of obtained catalysts, were characterized by means of N_2 adsorption, XRD, *Py*-FTIR, ^{27}Al MAS NMR, H_2 and CO chemisorption. The activity and selectivity of obtained catalysts was examined in catalytic tests (hydroconversion of *n*-C_7 and *n*-C_{16}).

The obtained results indicated that the use of HNO_3 acid for AlSBA-15 synthesis resulted in rise of Al incorporated into mesoporous SBA-15 walls, thus the concentration and strength of acid centers of the carrier were increased. It was confirmed that the total acidity modification of the supports containing AlSBA-15 is possible *via*: (*i*) adding of the zeolite during hydrothermal synthesis of AlSBA-15, (*ii*) using zeolites with different Si/Al ratio, (*iii*) adding distinct amounts of zeolite into the support. Rise of the total acidity of the biporous catalysts (AlSBA-15+zeolite) enables their activity increase in n-alkanes hydroconversion, simultaneously increasing yield of isomers even at lower temperatures in comparison with pure AlSBA-15.

Applying various Pt-precursors impacts the metal dispersion and catalyst selectivity towards C_7 and C_{16} isomers. Incorporation of metal using anionic Pt-precursor enables the highest dispersion and the greatest dehydrogenation/hydrogenation properties. It was confirmed that proper balance between the metal and acid function, enables introducing 0.5-0.7 wt.% of Pt (high catalytic activity with simultaneously high selectivity towards isomers). Catalytic tests over bimetallic Pt-Pd catalysts supported AlSBA-15+zeolite indicated, that one-step incorporation of metals, results in rise in dispersion of metal phase and in an increase of isomer yield in comparison to monometallic catalyst.