SYNTHESIS, CHARACTERIZATION AND CATALYTIC PERFORMANCE OF BIMETALLIC Ir-Pt CATALYSTS FOR TETRALIN HYDROGENATION

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Bimetallic Pt–Pd catalysts have received considerable attention, because they show high activity in a variety of catalytic applications (1) and stability compared with monometallic Pt or Pd catalysts. For instance, the bimetallic Pt–Pd catalysts have been shown to have higher resistance toward poisonscompared to Pt catalysts (2-4). For supported bimetallic clusters, the surface and bulk composition strongly depend on a series of parameters, for example, preparation procedures, metal–metal and metal–support interactions. The final goal is to find the optimal proportion of each metal in order to be more active in these processes.In this case a series of Ir and Pt modified SBA-15 were prepared by the consecutive wet impregnation method, with different content of each metal. The final catalysts were characterized by XRD, TEM and H_2 chemisorption to study the effect of content of metal on the dispersion of iridium/platinum. The catalysts synthesized with similar percentage of both metal showed the best activity measured in tetralin hydrogenation.
Platinum (Pt) and Iridium (Ir) nanoparticles were incorporated into SBA-15 support [1-4] by the wet co-impregnation method. The metal precursors were Iridium acetylacetonate and cloroplatinic acid. The samples were calcined at 500°C and previous to the catalytic test the samples were reduced by heating at 2°C/min to 450°C in a H_2 stream for 5 h. Hereinafter this catalyst will be referred as Ir-Pt- SBA-15 (x), with x= 1-3.
The catalytic activity was measured in a 4563Parr reactor, at 250°C, 15 atm of pressure of hydrogen and 360 rpm for tetralin hydrogenation (feed consisted in 50 mL of 5% v/v of tetralin (98.5% FLUKA) in Dodecane).
The Pt-Ir-SBA-15 catalyst with 1 %wt. of each metals had the highest activity measured in tetralin hydrogenation at mild conditions. The good activity was correlated with higher Ir/Pt dispersion on SBA-15 mesostructured material used as support, as we seen by TEM and H_2 Chemisorption, with higher active metal sites exposed to reactant. The Ir-Pt-SBA-15 activity is sufficiently high to envisage use in the final stages of a refinery process producing diesel fuel of high Cetane Number by hydrodearomatization.

Keywords: Iridium-platinum containing SBA-15; Hydrogenation; TEM

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