

Abstract

Activity and selectivity of a series of bifunctional sulphated zirconium-pillared montmorillonite (Zr-MS), aluminium-pillared acid-activated montmorillonite (Al-MH), aluminium-pillared sodium montmorillonite (Al-MNa), and γ -alumina catalysts supported palladium were compared in hexane hydroconversion reactions. Hydrogen and hydrocarbon partial pressures as well as reaction temperatures were changed. The product distributions were analysed and kinetic data were collected. Sulphated Zr-pillared montmorillonite supported palladium catalyst is the more active catalyst and acts as an excellent hexane hydroisomerisation catalyst giving very high isomer selectivity around 98%. At the opposite, 1 wt.% Pt/ γ -alumina is the less active and less selective catalyst. In skeletal isomerisation of hexanes and in methylcyclopentane reactions we pointed out that both acid strength and metallic behaviour are important. The latter one prevents any blocking of the active sites by formation of (hydro)carbon residues thanks to its hydrogenation power. Activation energy values, enthalpy and entropy of activation have been determined. In all the reactions studied and with all the catalysts used, a compensation effect is observed. To explain the results, a metal-proton adduct is proposed as active site. The relative strength of the acid function versus the metallic one explains the results.