SUMMARY

Pt-loaded H-ZSM-5 catalyst are classified under bifunctional acid-zeolite catalysts. The H-ZSM-5 (pentasil) zeolite is characterized by its large number of acid sites which acquire high strength. Moreover, this zeolite possesses tridimentional channels with internal sinusoidal structure. Moreover, platinum proved its superiority as a hydrogenation-dehydrogenation metal. The combination of H-ZSM-5 zeolite (pentasil type) with Pt motivated preparing and testing some series of catalysts including such combinations for the hydroconversion of n-hexane. Therefore, the acid sites number and strength were modified via various dealumination techniques, namely; ***a)*** dealumination using a solution of the chelating agent (ethylenediaminetetraacetic acid, EDTA). ***b)*** doping of HF solution in order to contain 3.0 wt % F, ***c)*** hydrothermal treatment using steam at a temperature of 500°C in presence of NH_3 and N_2 , ***d)*** a combination of treatments ***(a)*** and ***(b)*** as well as, ***e)*** a combination of treatments ***(b)*** and ***(c)***.

The second component of bifunctionality is the metal which is responsible for the hydrogenation-dehydrogenation reaction steps. In this work the metal component is platinum. Modification of this catalytic component was achieved via changing the percentage of Pt between 0.15 and 0.60 % (most of the commercial catalysts contained 0.3 - 0.4 wt % Pt).

The activities of the prepared catalysts containing modified H-ZSM-5 zeolite for the different reactions taking place during the hydroconversion of n-hexane, i.e., hydroisomerisation, hydrocracking as well as dehydrocyclization were accurately investigated in a pulse-microcatalytic reactor at temperatures between 250 - 500°C, carrier gas flow rate (H_2) of 20 cm^3 min^{-1} and injections of 1µl.

The product distribution was determined using a gas-chromatograph directly connected to the outlet of the reactor. The GC column was 10% OV-101. All reaction components were separated except for 2-methylpentane and 2,3-dimethylbutane which were eluted as a single peak. The values of 3-methylpentane and 2,2-dimethylbutane in product relative to their corresponding thermodynamic equilibrium values were calculated at different reaction temperatures using the different catalysts under study. The C_1+C_2 component in the hydrocracked product was traced using all catalysts to shed light on the hydrocracking direction (whether terminal or centric) as well as on the activity for hydrogenolysis. The ratio of iso-butane/n-butane and iso-pentane/n-pentane in the product was discussed concerning the isomerization susceptibility even when no hexane isomers were produced.

The acid site strength distribution was investigated using a differential scanning calorimeter wherein presorbed ammonia on the catalysts was desorbed by making use of the programmed temperature

increase in an inert atmosphere. On the other hand Pt dispersion in the zeolite support was determined via hydrogen chemisorption using a pulse technique on basis of 1:1 stoichiometry.

Simple kinetics was investigated for the hydroconversion of n-hexane, where the apparent reaction rate constant and apparent activation energy were estimated and discussed.

Correlation of the different treatments were carried out to clarify their advantages and disadvantages. It appears that EDTA dealumination of the zeolite, can be considered as optimum, where 0.15% Pt or 0.30 % Pt was used as the metal component. The unloaded zeolites, whether unmodified or modified by any of the dealuminating techniques under investigation, are only active for hydrocracking reactions.