
Effect of Na Loading On the Properties of Catalysts And *n*-Heptane Isomerization Over $\text{Pt}/\text{SO}_4^{2-}$ - ZrO_2 Catalyst

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The acidic properties of $\text{Pt}/\text{SO}_4^{2-}\text{-ZrO}_2$ (PSZ) have been characterized by a combined study using temperature-programmed desorption (TPD) of ammonia and infrared (IR) spectroscopy. PSZ samples were prepared by impregnation of $\text{Zr}(\text{OH})_4$ with 1.0N of sulfate ion and calcined at 873 K, followed by addition of 0.5wt% Pt. Then 0.1 and 0.5wt% of Na were loaded in order to change the acidity of PSZ. The ammonia TPD spectra confirmed the existence of peaks at 443 and 623 K corresponding to the weak and medium acid sites, respectively. The TPD plot did not change much by addition of 0.1wt% Na, but changed considerably by addition of 0.5wt% Na which the intensity of peak at 623 K decreased and the intensity of peak at 443 K increased. It is indicated the conversion of strong into weak acid sites by addition of Na. IR spectra of pyridine adsorbed on samples showed the presence of Na decreased the intensities of bands at 1450, 1490 and 1540 cm^{-1} which corresponding to pyridine adsorbed on Lewis, Lewis-Bronsted and Bronsted acid sites. The addition of Na caused a more extensive decrease in the number of strong Bronsted acid sites than in the number of strong Lewis acid sites. The activity of PSZ samples were examined by isotherm hydrogen adsorption and *n*-heptane isomerization. The presence of Na decreased the hydrogen uptake due to the reducing of the number and strong acid sites. The hydrogen uptakes in 8 h for the samples unmodified and modified with 0.1 wt% Na and 0.5 wt% Na were 6.19×10^{17} , 3.62×10^{17} and 2.66×10^{17} atom/ m^2 -cat, respectively. These numbers correspond to H/Pt ratios of 4.79, 2.75 and 2.01, respectively. The presence of Na decreased the conversion of *n*-heptane and increased the isomerization selectivity of *n*-heptane due to the weakening the acidity of catalyst.