Surface Acidity of Palygorskite-Supported Rhodium Catalysts

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Abstract: Infrared spectra of adsorbed pyridine have been used to obtain qualitative information on the nature of the interaction of pyridine with different rhodium catalysts supported on palygorskite and silica. Based on these data, qualitative definitions of the adsorption sites of these catalysts have been deduced. The catalysts were prepared with natural palygorskite, and palygorskite dehydrated *in vacuo* at 150°C and 400°C. In this way, catalysts were obtained that had different water contents and, therefore, different acidities. Lewis-bound pyridine was detected by infrared spectroscopy from room temperature to 500°C. The greatest acidity was found in a catalyst prepared with the palygorskite support dehydrated at 150°C before preparation of the catalyst. With this catalyst, strongly hydrogen-bound pyridine was observed when evacuation was carded out at temperatures between 150°C and 300°C. Catalysts prepared with the palygorskite support pretreated at 400°C did not exhibit strongly hydrogen-bound pyridine, and Lewis acidity decreased significantly. As expected, hydrogen-bound pyridine was also detected for rhodium supported on silica. However, it was desorbed at temperatures below 150°C. The results of the acidity studies follow the same pattern as those for 1 -hexene double-bond migration under hydrogenation reaction conditions.

Key Words: Pyridine • Catalysis • Palygorskite • Rhodium • Surface acidity

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