Catalytic Properties of Erbium Oxide in Dehydration of Alcohols and in Dehydrogenation of Alcohols and Tetralin

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Erbium oxide is a good dehydration and dehydrogenation catalyst for ethyl-, isopropyl-, and n-propyl alcohols, and, particularly, as a dehydrogenation catalyst for isobutyl alcohol. The activation energies of these reactions and of dehydrogenation of tetralin were calculated. The energies of C, H, and O bonds with erbium oxide were determined kinetically.

Oxidation Kinetics of Hydrogen Chloride Over a Chromium Oxide Catalyst

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Based on the experimental data for oxidation of hydrogen chloride over a chromium oxide catalyst, an equation was developed to correlate the reaction rates with the initial reactants concentrations and the degree of conversion. Adsorption of oxygen is the reaction limiting stage. The activation energy of the reaction is 18.3 kcal/mol.

Kinetics of Hydrogenation Reactions in Non-Gradient Systems

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A non-gradient method to study reaction kinetics was applied to the liquid phase hydrogenation of ethylene and acetone, using a skeletal nickel catalyst.

Kinetic data were obtained for these reactions in non-gradient systems. The hydrogenation rates of ethylene and acetone are respectively described by the following equations:

$$\omega = kP_{H_2}, \qquad \text{and} \qquad v = k\frac{P_{\mathrm{ac}}P_{H_2}{}^{0.5}}{P_{\mathrm{alc}}{}^{0.5}}$$

These equations are based on the assumption that over non-homogeneous surface catalysts these reactions occur in two stages.

Kinetics of Dehydrogenation of Cyclohexane Over Palladium Films

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The relationship between the gaseous hydrogen accumulation rates and the reaction temperatures was investigated over palladium films at "irreversible catalysis" conditions. For dehydrogenation of cyclohexene over the films, the heat and entropy of its adsorption and the activation energy of its dehydrogenation were calculated by use of Langmuir-Hinshelwood equation, on the assumption that it fully describes this reaction.

Catalytic Activity of Synthetic Zeolites in Cracking of Cumene

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Activities of synthetic X and Y cationic and decationized zeolites were determined for cracking of cumene.

The heats of adsorption were determined for each reaction component. The decationized zeolites have the greatest activity.

Activity of the type X zeolites sharply increases with calcium content.

The reaction rate constants and activation energies were determined for each exploratory sample.

Quinoline, if present, poisons by adsorption the decationized catalysts in high temperature cracking of cumene.

The nature of the active centers of different zeolite types is discussed in some detail.

Determination of Acidity of Solid Oxide Catalysts by Thermometric Titration

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An improved apparatus is described for determination by thermometric titration of aprotonic acidity of solid catalysts. Acidities of many mixed oxide catalysts were determined, including aluminosilicates, aluminochromates, zirconosilicates, calcium silicates, etc.