Rare-Earth Oxides as Catalysts for the Oxidation of Propylene

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Oxides of lanthanum, cerium, praseodymium, neodymium, samarium, gadolinium, terbium, dysprosium, holmium, and erbium catalyze the oxidation of propylene to CO_2 and H_2O plus small quantities of acrolein. The authors have determined the activation energies for this complete oxidation of propylene on oxides of Nd, Sm, Gd, Dy, Ho, and Er. Comparison of these results with data on isotopic exchange (of oxygen) between O_2 and the rare earth oxides leads to the conclusion that the activity of these oxides in both of the above reactions is governed by the energy of the bond between the O_2 and the catalytic surface.

Catalysis of Decomposition of Formic Acid by Heat-Treated Polyvinyl Ketone

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The authors have studied the kinetics of dehydrogenation and dehydration of formic acid over PVK which had been heat-treated at 400°–870°C. If the heat-treatment takes place under N_2, then the activation energy for dehydrogenation is 28 ± 1 kcal/mole. There was no direct relationship between changes in electronic characteristics of the heat-treated PVK (such as electric conductivity, work function, and concentration of paramagnetic sites) and the activity. Nevertheless, the data on the effect of the atmosphere surrounding the PVK during the heat treatment allow some conclusion about the electronic mechanism of formic acid dehydration.

Effect of the Nature of the Promoter on the Activity of the Chromia-Alumina Catalyst for Isopentane Dehydrogenation

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The authors have studied the dehydrogenation of isopentane to isopentenes (550°C; atmospheric pressure; space velocity of 1 hr^{-1}; flow system) over chromia-alumina catalysts promoted by elements of Groups I (Li, Na, K, Rb, Cs) and II (Be, Mg, Ca, Sr, Ba). Alkali promoters increase the dehydrogenation activity and decrease the activity for rearrangement and cracking. Beryllium and magnesium oxides have a smaller effect on the above reactions. The lithium-promoted catalyst proved to active, selective, and to require low contact times. Its activity for rearrangement and cracking is low.

Isomerization of Cyclenes on Aluminum Oxide. I. Isomerization of 1-Methyl-1-Cyclohexene

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The authors used flow and pulse chromatographic techniques to study conversions of 1-methyl-1-cyclohexene, varying the temperature and the contact time. The results obtained from the pulse unit were identical to those obtained in the flow system. Below 400°C, the main reaction is isomerization. At low temperatures most of the product consists of 1-methyl-3-cyclohexene. Above 220°C, molecular rearrangement takes place: the primary product is 1-ethyl-1-cyclopentene. As the temperature and contact time are increased, this reaction starts to yield dimethylcyclopentenes as the main products. From the kinetic curves obtained, the authors surmise that 1-ethyl-1-cyclopentene and 1-methyl-3-cyclohexene are intermediates in the isomerization of the starting 1-methyl-1-cycloxene.

Kinetics of SO_2 Oxidation on Vanadium Catalysts

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The authors used a flow-recycle technique to study the oxidation of SO_2 on a BAV catalyst at 485°C. The applicability of known kinetic equations was confirmed, and the deviations from them were noted. An equation describing the process under the above conditions is given.

The Mechanism of Cumene Oxidation on Copper Phthalocyanine

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Kinetics of decomposition of cumene hydroperoxide on copper phthalocyanine were studied.