Some of the governing principles were determined in oxidative ammonalysis of propylene to acrylonitrile (Reaction I) and in oxidation of propylene to acrolein (Reaction II), using a recycle-continuous unit and a bismuth-molybdenum catalyst. Kinetically, both reactions are of the first order with respect to propylene; with respect to oxygen, both are of the zero order, provided that the partial pressure of the oxygen is not below a specified minimum value. The results show that Reaction I is not retarded by the reaction products; Reaction II, on the other hand, is retarded by the acrolein product. The reaction rates of the two processes become practically identical, when the acrolein, produced in Reaction II, is continuously removed by freezing out. The effect of varying partial pressure of the ammonia on the product composition was determined for Reaction I. It is believed that formation of different nitriles in Reaction I is via formation of the corresponding aldehyde intermediates.

Effect of Chemical Composition and of Methods of Preparation on Physico-Chemical Properties of Complex Oxide Catalysts: Silica-Magnesia Catalysts

V. A. Dzees'ko, M. S. Boreesova, L. G. Karakcheyev, A. D. Makarov, N. S. Kotzar'yenko, R. I. Zeesman and L. A. Khreepeen

The Catalysis Institute of the Siberian Division of the Academy of Sciences of USSR

The structure and phase composition were determined for several samples of silica-magnesia catalysts. The investigation shows that during the preparation these catalysts form a specific silicate structure with the magnesium atoms in a lowered (quaternary) coordination relative to the oxygen.

The effects of chemical composition and of methods of preparation on catalytic activity were evaluated in dehydration of isopropyl alcohol. The greatest concentration of acidic centers was found in the catalyst samples with the highest content of the four-coordinated magnesium. Activity of a milliequivalent of the acid centers is not affected by the composition of the silica-magnesia catalysts tested.

Catalytic Properties of the Oxides of Metals of Period IV of Periodic Table in Oxidation Reactions: Decomposition of Nitric Oxide

T. M. Yur'yeva, V. V. Popovsky and G. K. Bor'yeskov

The Institute of Catalysis of the Siberian Division of the Academy of Sciences of USSR

Catalytic properties of different transition metal oxides (TiO_2; V_2O_5; Cr_2O_3; MnO_2; Fe_2O_3; Co_3O_4; NiO; CuO; ZnO) were determined by statistically evaluating the results of decomposition of nitric oxide in a recycle-continuous unit. The order of the reaction with respect to NO and the reaction rate-temperature relationship were determined.

Effect of Platinum and Sodium Content on Aromatization Activity of Pt/Al_2O_3 Catalysts

N. R. Boorseean, S. B. Kogan and Z. A. Davidova

The All-Union Scientific Research Institute, "Vniin'yft'yekhim," for Petrochemical Processes

The effects of 0.01–1.2% (wt) Pt and 0.02–1.6% (wt) Na on properties of Pt/Al_2O_3 catalysts were determined in aromatization of n-hexane at atmospheric pressure and a temperature of 545°. In addition, conversion of n-hexene-1 was studied over an Al_2O_3 catalyst at the conditions above.

Various schemes of formation of alkyl aromatics from n-hexane were considered. A scheme for conversion of n-hexane over a Pt/Al_2O_3 is described, which assumes concurrent formation of alkyl aromatics on both the Pt and the acidic centers. The experimental data presented show that the optimum concentration of sodium is a function of the Pt content in the Pt/Al_2O_3 catalysts.

Activity of Ferric Oxide-Molybdena Catalysts in Oxidation of Methanol to Formaldehyde: Specific Activity as a Function of Composition

G. D. Kolov'yertnov, G. K. Bor'yeskov, V. A. Dzees'ko, B. I. Popov, D. V. Tarasova and G. G. B'yeloogeena

Institute of Catalysis of the Siberian Division of the Academy of Sciences of USSR

A study of the effect of chemical composition of ferric oxide-molybdena catalysts on specific catalytic activity in oxidation of methanol to formaldehyde demonstrates the non-additivity of the catalytic properties of the starting components and of individual catalysts in a mixture. The catalysts with the Mo/Fe ratio of about 1.7 have the greatest activity for conversion of methanol to formaldehyde. It is believed that the active component of this catalyst is a chemical compound of iron and molybdenum oxides, containing about 60% of Mo.

Mechanism and Kinetics of Carbon Monoxide-Steam Reaction Over a Ferric Oxide-Chromia Catalyst