A Study of the Process of Thermal Activation of Chromogel by the EPR (Electron Paramagnetic Resonance) Method

By U. I. Pyecherskii, V. B. Kazanskii, and V. V. Voyevodskii

Investigation was made of the influence of calcination temperature upon catalytic activity of a chromogel and the width of EPR band. The possibility of correlation between the magnetic and catalytic properties of a calcined oxide of chromium is discussed.

Investigation of Dehydration of Primary Normal Amyl Alcohol and of Isomerization of Pentene-1 Over Silica-Alumina Catalysts

By L. H. Freydleen, V. Z. Sharf, Z. T. Toohtamooradov, and E. F. Leetveen

Dehydration of primary n-amyl alcohol over an aluminosilicate catalyst is accompanied by isomerization of pentene-1 into pentene-2 and by skeletal isomerization of normal pentenes. The isomerization rate of pentene-1 is appreciably greater than the rate of its formation from the alcohol; at the same time, the reaction products closely approach equilibrium composition. In absence of the alcohol, pentene-1 also isomerizes into pentene-2 and 2-methyl butene-2. In the latter case, the rate of double bond shift is not as rapid as in the presence of the alcohol.

Hydrochlorination of Acetylene Over Aluminum Oxide

By K. V. Topchiyeva and C. A. Venyameenov

The addition of hydrogen chloride to acetylene was studied over a mercury-free commercial aluminum oxide catalyst. An improvement was attained in the technique of carrying out the reaction in a continuous flow-system and reliable methods were developed to analyze the reaction products. The kinetics of hydrochlorination of acetylene was studied at a temperature of 302°, and it was demonstrated that the experimental data obtained can be satisfactorily expressed by the first order equation for heterogeneous continuous-flow catalytic reactions.

Investigation of the Process of Poisoning of Nickel Catalysts by Thiophene

By G. D. Liubarskii, L. V. Lebiedieva, and N. V. Koolkova

The regularity of poisoning of nickel catalysts on carriers by thiophene was established in this work. It was demonstrated that in absence of hindered diffusion the loss of catalytic activity is linear and that the activation energy for hydrogenation of benzene is not affected by poisoning.

A method, employing chemisorption of oxygen, was developed for determination of differential surface areas of nickel in the catalysts. This makes possible to calculate sulfur-capacitance per unit area of nickel surface. The specific sulfur-capacitance and specific activity were found to be approximately equal for a number of complex catalysts. For this reason, determination of the amounts of thiophene adsorbed can be utilized as a method of measuring surface areas of the nickel. The data obtained point to the near-homogeneous nature of nickel surface.

A scheme is described for chemisorption of thiophene and for hydrogenation of it over nickel. Usefulness of nickel catalysts is discussed for purification of benzene and of other solvents from sulfur-containing compounds.

Effect of Carriers on Properties of Propylene Oxidation Catalysts

By J. B. Gorohovatzkii, M. J. Roobanyek, and E. N. Popova

Investigated was oxidation of propylene over catalysts which were prepared by deposition of copper oxide on glass, aluminum oxide, and carborundum carriers of various structural characteristics. The selectivity and product yields were found to be dependent upon the nature and structure of a carrier employed. An explanation is offered for the laws governing behavior of the carriers.

Poisoning of Iron Catalysts Used in Ammonia Synthesis

By E. H. Yeneekeyeff and A. V. Krilova

The catalytic poisons—O_2, CO, CO_2, H_2O, and H_2S—were found to increase the work function of the iron catalysts for synthesis of ammonia by 0.2 to 0.6 ev. These results, together with those obtained earlier (1), make it possible to construct an electrostatic model depicting poisoning and promotion of catalysts for production of ammonia.

Optimum Conditions for Production of Ethylene Oxide

By M. G. Sleenko, J. M. Boojdan, V. S. Beskov, and I. D. Yemelyanov

By dynamic programming with the aid of electronic computers, there was determined a technologically optimum system for the process

of oxidation of ethylene in consecutively placed catalyst layers. Ideal mixing and a method of varying ideal displacement from the static layers were employed. It was shown that for two parallel reactions, in which the activation energy of side-reactions is greater than that of the useful one, the optimum temperature must increase with progressive increase in conversion. Calculated quantities of catalyst essential to achieve various yields of ethylene are also presented.

Interferometric Method for Study of Reaction Kinetics

By A. J. Rozovskii

In a study of kinetics of gaseous phase reactions, usefulness of the interferometer was examined to determine the extent of conversion in continuous-flow and continuous recycle-flow systems.

To determine the degree of conversion of a multicomponent mixture in terms of the concentration values of its component "k," when this is present in either stoichiometric or non-stoichiometric amounts, it is sufficient to know the following:

(1) Concentration of component "k" in the charge mixture;

(2) Equation for the reaction;

(3) Instrument readings for the gaseous mixtures entering, flowing, and leaving a system.

Recycle-Flow Reactors for Measuring Catalytic Activity

By G. P. Korneychook and Yu. I. Pyatneetzkii

Two types of contact recycle-flow reactors are described for determination of catalytic activity as well as for investigation of the kinetics of heterogeneous catalytic processes within the conditions for which each recycle-flow system is designed. The contact reactor of the first type has a plunger-type circulation pump, operated by an electromagnetic coil. The reactor of the second design is equipped with a screw-type circulation pump which is activated by a Warren motor or by an electric motor via a drive and a packing gland. The use of a closed type nonsynchronous electric motor is also possible by equipping it with a steel rotor and by insulating the inner metal reactor walls with a non-conductive lining.