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The kinetics of conversion of carbon monoxide in different concentrations in the reaction mixture were investigated over a ferric oxide-chromia catalyst at atmospheric pressure and temperatures of 390–483°. The experimental data of this study are in good agreement with the data calculated by use of Equation 24, which is based on the assumption that the reaction occurs in two steps.

The results calculated by use of Equation 24, modified for continuous operation, are compared with published experimental data.

The Nature and Causes of Aging of Chromia-Ferric Oxide-Zinc Oxide Catalyst

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The properties of fresh and of completely spent samples of a chromia-ferric oxide-zinc oxide catalysts, used in dehydrogenation of n-butylenes and of divinyl, was determined by physical methods. The samples have a chromia-spinel structure. The phase compositions of the fresh and the spent samples do not show any substantial differences. Specific catalytic activities of the fresh and of the spent samples were found to be equal. The loss of activity and aging of the catalyst are associated with a decrease of specific surface due to recrystallization.

Isotherms and Heats of Adsorption of Vaporized Benzene on Argillaceous Minerals

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The isotherms and differential heats of adsorption of vaporized benzene on montmorillonite, kaolinite, metahalloysite, and ferrihalloysite were determined at a temperature of 20°, using an adsorption calorimeter equipped with a heat exchanger.

The results show that the saturation volume of adsorbed benzene vapor decreases with increasing evacuation temperatures of each mineral, except for kaolinite—where the reverse is true.

With kaolinite and metahalloysite, the differential heat of adsorption curves pass through a maximum point, whereas with montmorillonite and ferrihalloysite, the curves continuously rise. With increasing evacuation temperatures, mobility of adsorbed benzene molecules changes relative to their mobility in liquid state. The shape of the entropy curves provides the information regarding the benzene adsorption mechanism over the argillaceous minerals investigated.

Structure of Aluminum Oxides

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A study of the phase composition and structure of the products of thermal decomposition of aluminum hydroxides at temperatures of 300–950° reveals evolutionary character of transformation of the crystal lattice of aluminum oxide. The multiplicity of Al_2O_3 forms is discussed, based on the results of X-ray analyses. It is concluded that two polymorphic modifications of aluminum oxide exist: one, comprising the densest cubic packing of the oxygen ions, is formed at a low temperature; the other one, the corundum form, comprising the densest hexagonal packing of the oxygen ions, is formed at a high temperature.

Determination of Specific Surface of Solids by Thermal Desorption of Argon

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An improved chromatographic technique of thermal desorption is described to determine specific solid surfaces of 0.01 to 600 m^2/g, and greater. By use of this technique, simultaneous adsorption on six catalyst samples can be carried out, regardless of their individual pretreatment history. Use of this method, in conjunction with an integrator for determination of the areas, enables surface measurement of 12 samples in a 6-hour working period. Adoption of this rapid technique is recommended to research and industrial laboratories.

Mathematical Optimization of Platforming Process

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Based on pertinent kinetic considerations, a mathematical description of platforming process was developed. The analysis takes into account the effects of operating variables, composition of the catalyst, and the type, composition, and boiling

range of the feed stocks. The kinetic parameters of the reactions in platforming process are defined mathematically. In general, good agreement obtains between the calculated and experimentally-determined values. This mathematical analysis is useful in optimizing and/or controlling the process.

BRIEF COMMUNICATIONS:

Applicability of the Radical-Chain Reaction Scheme to Kinetics of High Temperature Oxidation of Methane in Presence of Oxides of Nitrogen as the Initiators

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The experimental data of kinetics of oxidation of methane to formaldehyde in presence of oxides of nitrogen were worked-up, assuming that the role of the oxides is solely to initiate formation of methyl radical and that thereafter the oxidation proceeds according to the generally-accepted S'yem'yonov's reaction scheme. Use of this assumption leads to significant discrepancies between the calculated and the experimentally-determined values of the constants of elementary reactions.

Radiolysis of Concentrated Aqueous Solutions of Isopropyl Alcohol in Presence of Oxygen

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The results of radiolysis of 0.01 to 13 M aqueous solutions of isopropyl alcohol show that in absence of oxygen the product formation in the neutral and acidic solutions is due to both the direct and indirect effects of the radiolysis and that chain reactions do not occur. On the other hand, in presence of oxygen and 0.01 M $HClO_3$, chain reactions develop in 1 M, or higher, solutions of the alcohol. The chain reaction-controlling factors are temperature, dosage rate, and the solution composition.

Reactions of Atomic Hydrogen in $H_2O + H_2SO_4 + FeSO_4$ System: Reaction With Fe^{+2}

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EPR studies show that in an $H_2O + H_2SO_4 + FeSO_4$ system atomic hydrogen reacts with the Fe^{+2} ions to form complexes of the (Fe^{+2} . . . H) type. Exposure of the complexes to a long-wave length light at a temperature of 77°K results in regeneration of the hydrogen atoms.

Study of Oxidation of Finely Dispersed Tin With the Aid of Mössbauer Effect

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A study of the mechanism of oxidation of the aerosol particles of tin of 300–1,000 A in size reveals formation of SnO_2 on the particle surface. Application of the Mössbauer Effect greatly facilitates investigations of processes of this type.

Properties of Radiation-Catalytic Conversion of Methanol at Small Surface Coverages

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A study of radiation-catalytic conversion of methanol on the surface of silica gel was carried out at a temperature of 20° and the monolayer coverages of 0.007–1.5. Comparison of the results obtained in this study with the data for homogeneous radiolysis of methanol shows that a small catalyst surface coverage is the most important prerequisite of radiation-catalytic reactions.

Aluminum Fluoride as Hydrocarbon Cracking Catalyst

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Aluminum fluoride is an active and stable catalyst in cracking of cumene.

Mechanism and Kinetics of Carbon Monoxide-Steam Reaction Over Zn-Cr-Cu Oxide Catalyst

G. G. TSHCHEEBR'YA, N. M. MOROZOV AND M. I. T'YOMKEENA
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Conversion of carbon monoxide was investigated over a low-temperature Zn-Cr-Cu oxide catalyst at 300°. The reaction rate can be calculated by the equation shown. The form of this equation is identical with that of the equation derived earlier for the conversion over an oxidized iron-chromium catalyst.