Comparative Photoconductivity in Photosorption and Photodesorption of Oxygen on Zinc Oxide

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The concommitant determinations of conductivity and pressure show that in photosorption and photodesorption of oxygen in the presence of light, the changes in conductivity are qualitatively similar. The results show that, basically, photosorption of oxygen by the samples of zinc oxide at a room temperature cannot be caused by the observed increased concentration of free electrons in the presence of light, even though they contribute to the conductivity. An attempt is made to explain the photosorption and photodesorption of oxygen and the "slow" photoconductivity of zinc oxide. The attempted explanation is based on the hypothesis of partial deionization of the chemisorbed oxygen by the action of light, with subsequent capture of the liberated electrons by the surface traps.

Study of Chemisorption on NiO

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Chemisorption on nickel(ous) oxide was investigated, using donor- and acceptor-type mixtures in different combinations. The effect of a preadsorbed gas on adsorption capacity of NiO for another gas also was investigated. As a rule, the increases in the surface coverage are smaller than the corresponding additional increments adsorbed. However, three cases of super-additivity were observed. On the whole, the results of this study are best explained by the presence of competitive adsorption of the components on the adsorbing surface than by the generally-accepted simplified form of electronic theory of chemisorption on semiconductors.

Properties of Iron Oxide–Molybdena Catalysts in Oxidation of Methanol to Formaldehyde: Phase Composition and Nature of the Active Component

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A study of the phase composition of iron oxide-molybdena catalysts used in oxidation of methanol to formaldehyde was carried out with the aid of X-ray phase analyses and of the EPR, infrared spectroscopic and thermographic analytical methods. The results show that following precalcination at a temperature of 400°, the samples with the Mo/Fe ratio of 1.5 have only one phase, that of normal iron molybdate; this is precipitated as an amorphous mass but becomes crystalline on heating at 350°. Other catalysts, of different composition, have two phases: the normal iron molybdate phase and the phase containing an excess of MoO_3 or of Fe_2O_3. The normal iron oxide-molybdena composition is the active component of the catalyst.

Sorption and Chemical Reaction Kinetics in Intimate Mixtures of a Gas with a Fluidized Particulated Catalyst of Homogeneous Surface

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The equations are presented to describe kinetics of irreversible reactions of gases in intimate contact with boiling beds of catalyst particles characterized by homogeneous surface. In contrast to the equations to evaluate the reaction kinetics in static catalyst beds, the derived equations include the sorption rate constants as an extra term. Methods are reviewed to evaluate these constants by utilization of appropriate experimental data in the basic newly-derived kinetic equations.

BRIEF COMMUNICATIONS:

Mass-Spectroscopic Study of Kinetics of Fast High-Temperature Reactions: Thermal Decomposition of Acetone

M. M. GEEL'BOORD, F. B. MOIN,
AND V. U. SHEVCHOOK

(The name of the institution is not given)

A mass-spectroscopic method is described to evaluate kinetics of fast high-temperature reactions in a flowing gas stream. Kinetics of thermal decomposition of acetone were determined. At temperatures of 670°–820° and pressures of 50–110 mm Hg, the reaction is of the first order. The temperature-reaction rate constant relationship is expressed by the equation, $k = 2.7 \times 10^{15} e^{-69500/RT}$ sec^{-1}.