the homomolecular exchange rate. Addition of Ga and In to ZnO at 850° decreases the isotopic exchange rates. However, raising the calcination temperature of Ga-containing (0.5 at. %) ZnO catalyst from 850° to 1200°, also increases the isotopic oxygen exchange rate until it approximates that of pure ZnO. Except for the cases of Li addition to the carrier in amounts of 0.5 to 0.75 at. %, the rates of homomolecular exchange either equal or exceed by several-fold those of the isotopic exchange with ZnO.

A Mechanism of Radical Adsorption on Semiconductors and Phenomena of Radical Desorption from Hot Reactor Walls

By I. A. M'YASNEEKOV, E. V. BOL'SHOON, AND E. E. GOOTMAN

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This article summarizes the results of investigation of electroconductivity of ZnO films and of the electroconduction kinetics in the chemisorption-desorption of alkyl radicals. The kinetic correlations which are based on the experimental results of photolysis and pyrolysis of ketones are compared with those derived by assuming a radical adsorption-desorption mechanism.

As a result of this investigation, a new variant of the method to determine relative concentrations of radicals is proposed. This is based upon measuring in presence of adsorbed radicals the initial rates of electroconductivity changes at various test-points in semiconductors. A novel phenomenon uncovered is that of desorption of the radicals—initially in the reaction zone—from the reactor walls of quartz or glass.

Basic Concepts of the Mechanism of Activated Complex Formation from the Viewpoint of Electronic Theory of Catalysis on Semiconductors

By V. S. KOOZN'YETZOV

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This study represents an attempt to calculate the chemical reaction rates on catalytic semiconductor surfaces by applying Eyring's fundamental concepts of the theory of activated complexes. Basic equations are derived to cover the reaction kinetics. These account for the possibility that some of the reactants, products, and activated complexes are chemisorption-bonded to a semiconductor surface, with accompanying attraction of the free electrons and holes of the semiconductor. The subject equations were derived by assuming that the reaction system is in electronic equilibrium.

Kinetics and Reactivity of Aromatic Compounds in Halogenation Over Metal Halides: Halogenation of Benzene Over Chlorides of Aluminum, Tin, and Titanium

By N. N. LEBED'YEV AND J. J. BALTADJEE

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The kinetics and activation energy were determined for chlorination of benzene in presence of various solutions of Al_2Cl_3, $SnCl_4$ and $TiCl_4$. These catalysts differ significantly from the ferric chloride with respect to the effects of the solvent media with the reaction order relative to the catalyst. The effect of the media polarity on activity of these catalysts is in line with the anticipated changes in the activation energy; yet, activity of the catalysts increases with increasing activation energy values. Various solvation processes are believed to be the principal factors responsible for these results.

Investigation of Mechanism of Oxidation of Lower Hydrocarbons Using a Competing Reaction Technique

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Using a competing reaction technique, the authors demonstrate that oxidation of lower hydrocarbons on silver is by interaction of the oxygen and hydrocarbon molecules chemisorbed on the catalyst surface. The order of chemisorption and oxidation of these hydrocarbons over the silver catalyst is as follows: Iso-$C_4H_8 > C_3H_6 > C_2H_4 > C_3H_8$. Various possible reasons are given to explain the relationship between the properties and structures of the hydrocarbons studied.

Kinetics of Cumene Cracking Over Spherical Aluminosilicate Catalysts

By YU. S. NEEKEETEEN

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The kinetics of cumene cracking were studied at a temperature of 450° over several spherical aluminosilicate catalysts. The catalyst samples used were calcined at temperatures of 75° to