concentration in the alloy, decreases the power exponent, *m*, of the kinetic equation from 0.5 to 0.2.

Based on measurements of the reaction rates at equilibrium, catalytic activity per unit of surface of the alloys of widely different composition remains substantially constant despite changes in the crystal structure.

Catalytic Properties of Rare Earth Oxides in Conversion of *n*-Butane

KH. M. MEENACHEV AND YU. S. KHODAKOV

N. D. Z'yeleensky Institute of Organic Chemistry of the Academy of Sciences of USSR

Catalytic properties of oxides of La, Ce, Pr, Nd, Sm, Ho, Er, Dy, Yb, Tm, and Tb were investigated at temperatures of 400°–550° in a recycle-continuous unit, using statistical method of treatment of the experimental data. Catalytic properties of erbium oxide were also determined for conversion of ethylene, ethane, and propylene.

In all cases, the reaction kinetics were expressed by the first order equation. The specific reaction rate, pre-exponential factor, and activation energy were determined for each catalyst. Lack of correlation was noted between activation energy and magnetic properties of the rare earth oxides.

Electronic Factor in Kinetics of Chemisorption on Semi-Conductors

F. F. VOLKENSHTEIN AND O. P'YESHOV

Institute of Physical Chemistry of the Academy of Sciences of USSR; Department of Physics of M. V. Lomonosov State University of the City of Moscow

Kinetics of chemisorption on semi-conductor surfaces was investigated in the framework of the electronic theory, which takes cognizance of the electrically neutral and charged forms of chemisorption. Kinetics of each form are examined and the conditions to maintain electronic equilibrium on the surface of a semi-conductor are determined for the process. Activation energy of adsorption is calculated as a function of the parameters characterizing electronic state of a system considered. Characteristics of reversible and irreversible chemisorption processes are examined.

Kinetic Parameters of Dehydrogenation of Tetralin and Ethyl and Isopropyl Alcohols and of Dehydration of the Alcohols Over Erbium Oxide.

A. A. TOLSTOP'YATOVA, A. A. BALANDEEN, AND YUI TZEE TZ'YUAN

N. D. Z'yeleensky Institute of Organic Chemistry of the Academy of Sciences of USSR

The results are presented covering an investigation of kinetics of dehydrogenation of tetralin and of dehydrogenation *and* dehydration of ethyl and isopropyl alcohols—over an erbium oxide catalyst. The relative coefficients of adsorption of the products, true activation energies, and bond energies of the C, H and O atoms interacting with atoms of the catalyst were determined for each reaction. The thermodynamic functions: ΔF, ΔH, and ΔS, were calculated in adsorptive displacement of tetralin and isopropyl ether by the respective reaction products.

Hydrogenolysis of Ethane Over Nickel Catalysts in Continuous Flow Systems

A. A. BALANDEEN, T. A. SLOVOKHOTOVA, A. F. SHOLEEN, AND L. A. OOGOLTZEVA

Department of Chemistry, M. V. Lomonosov State University of the City of Moscow

The results of hydrogenolysis of ethane over nickel catalysts at temperatures of 290°–310° show that pretreating a Ni/kieselguhr catalyst with nitrogen at 290°–310° to displace the surface hydrogen lowers activation energy to 19 kcal/mole. Al_2O_3 and Cr_2O_3 carriers decrease activity of nickel catalysts.

Effect of Anodic and Cathodic Polarization of Catalysts on Their Activity in Ammonia Synthesis

L. M. DMEETREEYENKO, S. S. LACHEENOV, AND R. F. SEEV'YAKOVA

State University for Nitrogen Industry

In ammonia synthesis processes, cathodic polarization of catalysts increases initial yields of ammonia; on the other hand, anodic polarization decreases the yields. The more active a catalyst the smaller the initial effect due to cathodic polarization; the opposite is true of the anodic polarization. The catalysts are deactivated by extended cathodic polarization periods and activated by the anodic.

In ammonia synthesis over iron catalysts, promoting action of additives is attributed to acceleration of the onset of the acceptor stages in the electrochemical mechanism of the process. It is believed that the promoters serve to decrease concentrations of the surface-deactivating intermediates chemisorbed on the catalyst surface.

Adsorption and Isotopic Exchange of CO_2 on MgO and $Mg(OH)_2$

O. V. Krilov, Z. A. Markova,
I. I. Tr'yet'yakov, and
E. A. Fokeena

Institute of Chemical Physics of the Academy of Sciences of USSR

The results of differential isotopic analyses show that in terms of the activation energies the surface of MgO is homogeneous but that in terms of the heats of adsorption, it is heterogeneous. The kinetics of isotopic exchange between gaseous and adsorbed phases of a $CO - COO^{18}$ system shows that the rate of isotopic exchange is increased by increasing the reaction temperature and by addition of water; variation of partial pressure of CO_2 has little effect on the rate.

Inspection of the infrared spectra discloses presence of three different forms of CO_2 bonding to $Mg(OH)_2$, corresponding to three distinct mechanisms of adsorption and exchange of CO_2.

The types of active centers present in alkaline catalysts are speculated upon and their functions in acid-base catalysis are discussed.

Effects of Sintering and Oxygen Sorption by Nickel Catalyst on Kinetics of Para-Ortho Conversion and Isotopic Exchange of Hydrogen

I. R. Davidova and S. L. Keeperman

N. D. Z'yeleensky Institute of Physical Chemistry of the Academy of Sciences of USSR

The effects of oxygen preadsorption on a nickel catalyst upon different kinetic factors were determined in para-ortho conversion of hydrogen and in deuterium-hydrogen exchange reactions. The effects uncovered are attributed to stable adsorption of oxygen by the portions of the catalyst surface with high adsorption properties; the gas diffuses through the rest of the catalyst surface into the interior of the surface layer. The results obtained are in good agreement with the adsorption-chemisorption equilibrium data for oxygen by the catalyst.

Processes of Catalytic Conversion of Ethanol to Butadiene

S. K. Bhattachariya, N. D. Gangooli,
and B. N. Avastkhi

Department of Applied Chemistry of Indian Technological Institute, Karagpoor, India

A systematic study of conversion of ethanol to butadiene was carried out in one-stage and two-stage units, using static and fluidized beds of catalysts of different composition. In the systems of either type, a 60/40 Al_2O_3/ZnO catalyst was found to be the most active. In one-stage boiling-bed systems, the butadiene yields are very high, the optimum yield being 72.8%. The optimum yield for the one-stage static bed unit is only 55.8%. The results show that processing of ethanol in two-stage fluidized bed units does not improve the butadiene yields per unit of fresh feed; however, it does significantly improve the through-put rates.

An analysis of the experimental data indicates that use of fluidized catalyst beds is advantageous in one-stage operation; on the other hand, the use of static beds is probably preferable in two-stage processing systems.

Decomposition of Hydrogen Over Germanium Catalyst

V. M. Frolov

Institute of Chemical Physics of the Academy of Sciences of USSR

Catalytic decomposition of hydrazine over a powdered germanium catalyst is a reaction of zero order. The reaction activation energy is 20–22 kcal/mole. The decomposition products are ammonia and nitrogen. Catalytic properties of germanium are not predictable from the character of its conductivity.

BRIEF COMMUNICATIONS

Effect of Preparation Methods on Porous Structure of Beryllium Oxide

I. B. Sleen'yakova

L. V. Peesarjevsky Institute of Physical Chemistry of the Academy of Sciences of Ukrainian SSR

The character of porous structure of beryllium oxide is strongly influenced by the reactions occurring during formation and maturation of the suspended product. Precipitation at pH values of 7.7 to 8.5 results in beryllium oxide xerogels of high specific surfaces. The xerogels precipitated at a pH of 5.5 have small specific surfaces, relatively small pore adsorption capacity, and a relatively large number of macropores. Increasing calcination