Non-Equilibrium Kinetics in Ammonia Synthesis

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Based on experimental data, a generalized equation was derived to express kinetics of ammonia synthesis at any partial pressure of NH_3 (Ref. 38). This equation is based on the concept that chemisorption of nitrogen and addition of molecular hydrogen to the chemisorbed nitrogen are the slowest steps in the reaction. At normal reaction conditions this generalized kinetic equation becomes identical with that proposed earlier (Ref. 1).

The value of calculated activation energy, including the effects of the two controlling stages of the process, remains constant at a wide temperature range of 325° to 550°.

Duration of Induction Periods in Homogeneous Catalytic Reactions in Presence of Hydrogen Peroxide

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Homogeneous catalytic reactions were studied to correlate the length of their induction periods with the catalyst, hydrogen peroxide and iodide, concentrations and with acidity of the reacting mixtures.

Equations are proposed to describe kinetics of activation of tungstate and molybdate catalysts by the interaction of hydrogen peroxide and iodide in an acidic medium. Calculated values of the catalyst activation constant are also presented.

Reactions of α-Oxides: Kinetics of Secondary Reactions in Ethylene Oxide-Acetic Acid Interaction

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The results of a study of secondary reaction kinetics—comprising the interaction of ethylene oxide and acetic acid, the primary reactants, with monoacetate glycol, the primary product—enabled to determine similarities and differences of the acid-base mechanisms of the two parallel processes, to compare their reaction rates and activation energies, and to describe in detail the reaction steps and their sequence in each process.

Kinetic Principles and Mechanism of Dimerization of Styrene in Aqueous Solutions of Sulfuric Acid

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Kinetics of acid-catalyzed dimerization of styrene in aqueous sulfuric acid solutions was studied to produce a linear dimer, 1,3-diphenyl butene-1. The results show that this reaction is practically irreversible and that the interaction between molecular styrene and the carbonium ions is the rate-limiting step of the process.

Lack of agreement between the anticipated and the experimentally-determined relationship of the reaction rates to acidity of the medium is attributed to the participation of the reacting particles in the complex protolytic equilibrium of the process. These observations are supported by the data on ionization of styrene in this reaction system. An estimated value of true activation energy of dimerization of styrene is given.

Kinetics of Cracking of Cumene Over Aluminum Oxide Activated by Boron Fluoride

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The effects of varying the amounts of BF_3 chemisorbed on a commercial-grade Al_2O_3 and of the chemisorption temperature upon catalytic activity were investigated in cumene cracking reaction. The results of this study show that catalytic activity is a function of the BF_3 content and that it is practically independent of the chemisorption temperature.

This study of cumene cracking reaction kinetics was carried out in a continuous-flow reactor at temperatures of 371°-492° over two BF_3/Al_2O_3 samples differing in activity. The activation energy and a range of conditions valid for the reaction were also determined.

Effect of Regeneration Conditions on Activity and Composition of Aluminochromate Catalysts

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The effects of various regeneration conditions on activity of an aluminochromate catalyst were investigated in dehydrogenation of butane. A