JOURNAL OF CATALYSIS 7, 96–102 (1967)

Abstracts of the Articles in the Russian Journal, *Kinetics and Catalysis*, Vol. 7, No. 2, pp. 196–201, March–April (1966) Published by the Siberian Division of the National Academy of Sciences of the USSR

Investigation of Recombination of Atomic Hydrogen by Diffusion Calorimetry and Semiconductor Probe Techniques

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The feasibility of utilizing semiconductor films as the probes in determining absolute values of the coefficients of heterogeneous recombination of H-atoms was demonstrated with the aid of Smith's diffusion technique. The results obtained are compared with those of the H-atom concentration measurements along the major axis of cylindrically-shaped beds of semiconductors, using calorimetric and Vredé analytical techniques. Comparative values of the coefficients of recombination of atomic hydrogen on glass are listed, as determined by the calorimetric, semiconductor probe and Vredé's diffusion analytical methods.

The overall results of this study show that at the conditions investigated destruction of the free H-atoms is a reaction of the first order and that the destruction takes place both on the reactor walls and on the surface of the films.

Kinetics of Continuous Chlorination of Ethylene at High Temperatures

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The results of continuous chlorination of ethylene at temperatures of 320°–380° show that with C_2H_4 in excess concentrations and with the chlorine in concentrations of over 25%, the process "imitates" the first order reactions with respect to chlorine. At the experimental conditions investigated, kinetics of the overall chlorination process can be expressed by Arrhenius equation, $k = 7.2 \times 10^{12} \exp(-33{,}700/RT)$.

Mechanism and Kinetics of Thermal Decomposition of Ethane

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The results of a study of the mechanism and kinetics of thermal decomposition of ethane show that at temperatures of 522°–610° the reacion is of the first order at pressures of about 100–700 mm Hg; however, at the like temperatures and pressures of less than 100 mm Hg, the order of the reaction becomes higher. This change in the reaction order is practically independent of temperature.

The overall experimental information on thermal decomposition of ethane can be satisfactorily explained by assuming that at the reaction conditions the values of the monomolecular constants of ethane decomposition onto two CH_3 radicals and an ethyl radical are functions of the reaction pressure.

Kinetics of Radiative Polymerization of Allyl Monomers

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Based on the experimental data of polymerization of allyl alcohol, a reaction scheme is proposed for radiative polymerization of allyl monomers. The proposed scheme considers that initiation and growth of a chain occur with participation of the monomers and polymers produced, and that splitting of the chain is due to its degradative conversion to a monomer. For a reacting mass in a solution—with or without addition of inhibitors—the rates of conversion and polymerization, calculated with the aid of the derived equations, are in good agreement with the experimentally-determined values.