JOURNAL OF CATALYSIS 4, 313–318 (1965)

Abstracts of Articles from "Kinetics and Catalysis"; Vol. V, Issue 3, May–June, 1964, pp. 388–398. Edited by Siberian Division of the Academy of Sciences of USSR

Investigation by a Pulsed Mass-Spectrometric Method of Elementary Processes of Overcharging Thermal Ions on Molecules

By G. V. KARACHEVTZEV, M. I. MALKEEN, AND V. L. TALROZÉ

Institute of Chemical Physics of the Academy of Sciences of USSR

A pulsed method is proposed to investigate the processes operative in overcharging the thermal ions on molecules. Using this method, a study was made of overcharging of Ar^+, Kr^+ and Xe^+ thermal ions on CH_4, C_2H_4, and C_2H_6 molecules. The results show that in these cases, the value of the rate constant lies between 10^{-9} and 10^{-8} cm^3 sec^{-1} $molecule^{-1}$ and that the distribution of intensities of the mass spectra at overcharged conditions practically coincides with that of overcharging by 300 ev the Ar^+, Kr^+, and Xe^+ ions on the same light hydrocarbon molecules. An analysis of the results leads to the conclusion that resonance plays the predominant role in the processes studied. Also uncovered were the reactions involving participation of excited ions $Xe^+(^2P_{1/2})$.

Effects of Temperature and Pressure on Ignition Delay of Hydrocarbon-Air Mixtures in Adiabatic Compression

By A. N. VOEENOV, D. I. SKOROD'YELOV, AND F. P. SOKOLOV

Institute of Chemical Physics of the Academy of Sciences of USSR; Moscow Auto Highway Department

The effects of temperature and pressure on the length of delay in cold and hot flame ignition were investigated in adiabatic compression of 60/40 per cent mixtures of isooctane and n-butane in presence of stoichiometric amounts of air.

The results of this study show that at pressures of over 20 atm both the two-stage preignition and the regions with zero or negative temperature coefficients persist far into the combustion zone. The shape of the ignition region limiting curve depends upon the character of the changes in the duration of the delays within the region. The results obtained lead to the conclusion that evolution of the preignition process occurs with participation of three consecutively competitive reactions, each of which playing a predominant role within a well-defined temperature interval.

Two-Stage Ignition of Explosive Mixtures: Intensities of the First and Second Stages in Ignition of *n*-Heptane-Air Mixtures at Superatmospheric Pressures

By S. A. YANTOVSKY

State Institute for Nitrogen Industry and for Organic Synthesis

Experimental results are presented on the intensity of two-stage ignition of various air-n-heptane mixtures ($\alpha = 1$ and $\alpha = 0.8$). Ignition intensity of each stage depends upon initial processing conditions. The intensities of cold (I_{cf}), blue (I_{bf}), and hot (I_{hf}) flames are 1.04–1.2, 1.3–2, and 2.5–3, respectively. The corresponding amounts of consumed oxygen are 2–6, 14–40, and 50–70%. Of note are the relatively high intensity of the first, "thermo-chain" flame, stage and the low intensity of the second, "blue" flame, stage. A mechanism is proposed for the two-stage process of ignition, to explain it in qualitative terms.

Stage-Wise Addition of Bromine to Propylene at Low Reaction Temperatures

By V. A. LEESHN'YEVSKY AND G. B. S'YERGEIYEV

Department of Chemistry of M. V. Lomonosov State University in Moscow

A bromine-propylene system was investigated thermographically at low bromine addition temperatures. The results show that addition of bromine to propylene occurs via exothermal formation of molecular complexes.

Kinetics of Internal Photoeffect in Organic Semi-Conductors of Anthracene Type

By A. J. BOORSHTEIN

Institute of Chemical Kinetics and Combustion of the Siberian Division of the Academy of Sciences of USSR

Compared kinetically are the schemes of single- and double-excitation processes to produce uni-