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Potential Recombination of Atomic Hydrogen on Various Surfaces at Low Concentrations of the Atoms in the Gas Phase

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A novel method is described to determine potential recombination of atomic hydrogen on various solid surfaces, at low concentrations of the H atoms in the gas phase ($\sim 10^{11}$ atoms/cm^3). The extent of the surface recombination was determined using glass and several polymeric materials. The experimentally-estimated addition of the hydrogen atoms in the gas phase to solid propylene at a temperature of 77°K is $\sim 8 \times 10^{-4}$.

Experimental Determination of Coefficient, α, Characterizing the Potentiality of Transition of the Triplet States of Organic Molecules at the Δm Levels of ± 2

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The authors show that the concentrations of aromatic molecules at a stationary state can be determined from the kinetics of accumulation of the molecules at the levels of the triplet state measured at high intensities of light. A method is described to determine the coefficient α. This characterizes the relationship between potential transitions at the Δm of ± 1 and Δm of ± 2 and also is essential in the EPR determinations of concentrations of the molecules at a level of the triplet state. Using this method, the α values for coronene and phenanthrene were determined to be 35 and 30, respectively.

Thermal Decomposition of Nitromethane

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Autoignition of vaporized nitromethane in argon was investigated at temperatures of 700°–1300°K. The thermal decomposition of nitromethane is a reaction of the first order. The monomolecular decomposition constant, k, of nitromethane was calculated with the aid of the expression which relates a delay in the ignition with the kinetic and thermophysical parameters of the system. The constant, k, at temperatures of 700°–1200°K was determined by the expression below:

$$k = 10^{11.2}(57000/RT)^{2.7}\exp(-57{,}000/RT)\,1/\text{sec}$$

The values of the constant so obtained are in good agreement with the experimental data obtained at low temperatures. An explanation is offered for the observed deviation of the values of k at operating temperatures of over 1200°K.

Photochemical Decomposition of Polypropylene Hydroperoxide

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The results of a study of photochemical decomposition of the hydroperoxide groups of oxidized atactic polypropylene show that with the incident light of intensity bT of ~ 1 and wave length, λ, $\geqslant 300$ mμ, the decomposition — either in vacuum or in oxygen — is a reaction of the first order. The added oxygen retards the reaction rate. Reaction temperatures of 25°–50° have no effect on the rate.

At the inherent conditions, the rates of thermal and photochemical decomposition can be approximately equal. In developing the schemes for polyolefin photooxidation reactions, the above fact should be taken into consideration.

The Relationship Between the Parameters of Thermo-EMF Distribution on the Surface of a Copper Oxide Catalyst and Its Catalytic Activity in a Continuous Aging Operation

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The parameters of the thermo-EMF distribution on the surface of a copper oxide catalyst were compared with its catalytic activity in decomposition of hydrogen peroxide. The results show that