tion rate constants were calculated for several radiative reactions.

"Step-Wise" Recombination of Free Radicals in Irradiated Organic Compounds: Discussion of Proposed Formal Kinetic Model and of a Method to Evaluate Kinetic Constants

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Several models of "step-wise" recombination of free radicals in solid phase are discussed. The results of formal kinetic calculations are compared with the experimental data. An experiment to evaluate spacial distribution of the free radicals is proposed.

Formation and Reactions of Free Radicals in Organosilicons Irradiated by Ultraviolet Rays: Polyphenylmethylsiloxane

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EPR studies were made to determine kinetics of formation and reactions of free radicals in polyphenylmethylsiloxane. At a temperature of 77°K the radicals identified were $\dot{C}H_3$ and $R—\dot{C}H_2$. A study of kinetic principles to correlate intensity of ultraviolet light with accumulation of the free radicals shows that the $\dot{C}H_3$ radical formation, due to rupture of the Si—C chemical bond, requires two quanta of radiation; on the other hand, formation of $R—\dot{C}H_2$, which involves rupture of the C—H chemical bond, requires only one quantum.

The rate constants of methyl radical in the reactions below were determined as follows:

$$\dot{C}H_3 + M^* \xrightarrow{k_0^{eff}} CH_4 + R - \dot{C}H_2; \quad k_0^{eff} = 2 \times 10^{-3}\ \mathrm{sec}^{-3}$$

$$\dot{C}H_3 + M \xrightarrow{k_1} CH_4 + R - \dot{C}H_2; \quad k_1 = 3.5 \times 10^{-5}\ \mathrm{sec}^{-1}$$

$$\dot{C}H_3 + \dot{C}H_3 \xrightarrow{k_2} C_2H_6; \ k_2 = 1.2 \times 10^{-21}\ \mathrm{cm}^3/\mathrm{sec}$$

Kinetics of Isotopic Exchange Between Hydrogen and Water Vapor Over Nickel Catalysts: Effect of Transfer Reactions on the Reaction Rates

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The isotopic exchange reaction, $HDO + H_2 \rightleftarrows HD + H_2O$, was studied over a nickel-chromium catalyst in a recycle-continuous and in a single pass-continuous operation. The effects of the catalyst particle size and of linear velocity of the gaseous reaction stream were determined and an equation to evaluate chemical kinetics of internal diffusion was derived. The results at a temperature of 130° show that with the catalyst particles larger than 0.1 mm in size the isotopic exchange reaction proceeds by internal diffusion.

Catalytic Properties of Rare Earth Oxides in Oxidation of Hydrogen

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Catalytic activities of oxides of lanthanum, serium, praseodymium, neodymium, samarium, dysprosium, holmium, ytterbium, and lutecium were determined in oxidation of hydrogen at temperatures of 300° to 500° and total system pressure of 550 mm Hg. The concentrations of oxygen in the oxygen-hydrogen mixtures employed were 2% and 98%.

The results of this study show that the rare earth oxides investigated are catalysts of medium quality compared to the oxides of the central elements of the 4th period of the Periodic Table. Except for the oxides of praseodymium and neodymium, the activities of these oxides are of a like order of magnitude; the activities of praseodymium and neodymium oxides are of the next higher order.

The heats of activation of the reaction over these catalysts were evaluated and found to change with changes in the composition of the reaction mixture. The composition changes are believed to affect the stationary state of the reaction and activity of the catalyst.

Kinetics of Ammonia Synthesis Over Alloys of Iron and Cobalt

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A study of kinetics of ammonia synthesis was made over iron-cobalt alloys. Increasing cobalt