The Principle of Additivity of the Energy of Activated Complexes in Radical Reactions

By **F. B. Moin**

The physical meaning of atomic bonding energy is examined in terms of London's approximation of the Quantum Theory. The bonding energy and the corresponding interatomic distances are shown to be the magnitudes which are specific to individual molecules.

Mechanism of Radiative Oxidation of Organic Compounds by Molecular Oxygen

By **V. V. Sarayeva**

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The characteristic features of the mechanisms of radiative oxidation of individual organic compounds by molecular oxygen are examined, including radiative, radiation-thermal, and thermoradiative processes. The conditions are listed for transition from one process to another. The effect of the dosage is shown on the transition from a radiative to a radiative-thermal process. Insight is thus gained into the possibility of development of chain reactions at low temperatures and small dosage conditions.

With the aid of the methods proposed and only a limited number of data in the low, medium, and high temperature regions, full-range yield-temperature curves can be constructed, using different dosage values as the parameters.

Kinetics of Intermediate Stages of Hydrolysis of BH_4^- Ions

By **K. N. Mochalov, V. S. Khaeen, G. G. Geelmansheen**

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Of the competing stages in hydyrolysis of BH_4^- ions, the slowest, rate-determining stage is $BH_4^- \rightarrow BH_3OH^-$. This is a complex stage, involving at least two steps, of which $BH_4^- + H^+ \rightarrow [H^+BH_4^-]^*$ is the initial one.

The hydrolysis intermediates, BH_3OH^- and $BH_2(OH)_2^-$ ions, are somewhat less stable than the BH_4^- ion. $BH(OH)_3^-$ is the least stable ion, being hydrolyzed about 1,000 times faster than the others.

Empirical equations are proposed to calculate $\tau_{1/2}$, a half-time of the reaction of the intermediates due to hydrolysis of BH_4^- ion, as a function of the solution pH and of the reaction temperature. Another empirical equation is proposed to calculate the hydrolysis rate constants as a function of the reaction temperatures, using solutions with ionic strength, μ, of 0.4.

Effect of Media on Interaction of Isocyanates with Alcohols

By **R. P. Teeg'yer, S. G. Ent'yelees**

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The kinetics of interaction of 2,4-toluylene diisocyanate with methanol were determined in dioxane and in dioxane—dichloroethane mixtures. The reaction rates increase with increasing polarity of the reaction media. However, for the cases of weak donor-acceptor interaction of the reactants with a solvent, the dielectric constant is not the rate-determining factor.

Kinetics of Interaction of Hydrogen Sulfide with Reduced Bauxite

By **O. P. Korobcheiyev**

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A study of the kinetics of topochemical reaction of hydrogen sulfide with reduced bauxite at 75°–280° shows that it is a first order reaction with respect to H_2S. The activation energy and the rate constant of the reaction were determined. The results show that reduced bauxite extracts H_2S from combustion gases at temperatures of 350°–900°.

Nature of the Limiting Stages in Thermal and Photochemical Decomposition of Ionic Crystals

By **V. V. Boldir'yev, A. A. M'yedveensky**

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This article is a criticism of current usage by a number of investigators of the concept regarding a limiting function of the electronic excitation stage in thermal and photochemical decomposition of ionic salts. The concept is not deemed to be well-founded. The arguments to prove the existence of the limiting electronic stage are critically reviewed. The authors of this article emphasize the need for a more comprehensive evaluation of the constants to characterize the elementary decomposition stages in the reactions of this type when describing them as multi-stage processes.