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Heavy Ions and Thermal Equilibrium Ionization of Gases

By I. K. Lareen and V. L. Talrosé
Institute of Chemical Physics of the Acad. of Sciences of U.S.S.R.

This article presents calculated thermal equilibrium ionization values for water vapor, hydrogen and argon. The calculations take into account the effect of concurrent formation of heavy ions: H_3O^+; H_3^+; Ar_2^+.

It is shown that at temperatures of 2000° to 5000°K, taking this effect into account leads to a 2- to 4-fold increase of the total number of charged particles in the said systems as compared to the values calculated without taking into account the formation of the heavy ions.

Recombination of Radicals in Solid Organic Substances. II. Determination of Kinetic Principles

By V K. Yermolayev, Yu. N. Moleen, and N. Ya. Booben
Institute of Chemical Physics of the Academy of Sciences of U.S.S.R.
Institute of Chemical Kinetics and Combustion of the Siberian Division of the Academy of Sciences of U.S.S.R.

The kinetics of recombination of radicals were investigated for a number of organic substances exposed to fast electrons. For amorphous glycerine and n-butyl alcohol the recombination can be described by a second order equation. For a crystalline rapidly-"frozen" cyclohexane and for n-octyl alcohol the recombination is stepwise in nature and cannot be described by the usual kinetic laws. With large dosages of ionizing emissions the kinetic principles are substantially changed. The special features of the kinetics covering recombination of radicals are related to both the structural peculiarities of the substances under investigation and to the structural changes which may be caused by the radiation.

* Consideration of Oscillatory Spin Interaction in Oscillatory Relaxation of Diatomic Molecules

By E. E. Neekeeteen
Inst. of Chemical Physics of A.S. of U.S.S.R.

It is shown that the effect of spin of colliding molecules on their oscillatory relaxation in a gas is to decrease the relaxation period; whereupon, the corresponding contribution to the probability value of the adiabatic one-quantum deactivation is independent of temperature.

Polarographic Investigation of Kinetics and Equilibrium in Formaldehyde-Aminoacid Reaction

By Ya. I. Tooryan and B. P. Jantalai
The Leeseechansk Affiliate of the State Institute for Nitrogen Industry

Using polarographic technique, show that 10^{-3} M solutions of aminoacids in alkali and 0.01–1.0 M solutions of formaldehyde in alkali form corresponding mono- and dimethylol derivatives. The equilibrium constants were determined for these reactions in alkaline solutions as well as the decomposition rate constants of the monomethylol derivatives as functions of initial concentrations of amino acid and of formaldehyde in acid solutions. Show that the decomposition rate constants of the monomethylol derivatives of α-aminoacids are appreciably greater than those of β-aminoacids.

Also determined were the effects of substituents at α-carbon and of pH of the media upon values of the decomposition rate constants. In acid solutions, the constants corresponding to the limiting current for methylol derivatives depends but little upon the pH, therefore under these conditions the kinetic boundary of the limiting current, apparently, is not due to participation of the H-ions of the slow-down stage of the electrodic process.

Effect of Fe^{2+} and V^{5+} Ions Upon Kinetics of Oxidation of U^{4+} by Chlorate in Perchloric Acid and Sulfuric Acid Solutions

By L. A. Fiodorova and E. A. Kanievskii

Oxidation of U^{4+} by the chlorate in perchloric and sulfuric acid solutions is appreciably accelerated by addition of Fe^{2+} and, particularly, of V^{5+}. Upon addition of Fe^{2+} the reaction with respect to uranium becomes of zero order and has a clearly defined induction period. Apparently, this is related to a change in the limiting stage of the process. Additions of the vanadium exert catalytic effect without changing the order of the reaction with respect to uranium.

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* This is a literal translation of title and text. (Translator)