## Effect of Alkali Metal Carbonate Additives on the Kinetics of Reduction of Uranium Trioxide with Carbon Monoxide

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The effects of $Li_2CO_3$, $Na_2CO_3$, and $K_2CO_3$ were determined on the rate of reduction of uranium trioxide by carbon monoxide. The results show that the reduction rate is somewhat decreased by the added $Li_2CO_3$ and that it is appreciably increased by the $Na_2CO_3$ and $K_2CO_3$ additives.

The discussion of the results includes the consideration of formation of the corresponding alkali metals on the $U_2O_3$ surface.

## Thermoluminescence and EPR Spectra of Organic Substances Irradiated by Fast Electrons

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Thermoluminescence of various organic compounds (polyethylene, polystyrene, natural and synthetic rubbers, paraffins, cyclohexane, etc.) was studied by irradiating them with fast electrons at 77°K. The intensity of luminescence of the irradiated amorphous substances typically varies with the dosage up to the maximum dosage of 1–5 Mrad. Optical "bleaching" of the samples—after irradiation at low temperatures—results in a significant (ten- to one hundred-fold) decrease in the thermoluminescence intensity and, in a number of cases, produces changes in their EPR spectra. The authors conclude that radiothermoluminescence in organic substances is caused by a recombination of the ions due to their stabilization in these substances by the low-temperature irradiation.

## Origin of Compensating Effect in Chemical Reactions Occurring on Catalytic Surfaces of Semiconductors

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With the electronic theory of catalysis as the basis, a correlation between the changes in the experimentally-determined activation energy values and the preexponential factor of the Arrhenius equation was investigated in chemical reactions occurring on the surfaces of catalytically-active semiconductors containing various amounts of additives. The results show that, as a rule, the relationship between the experimentally-determined activation energy, $E_e$, and the logarithm of the preexponential factor, $K_0$, is quite complex. The sign of the derivative, $d\ln K_0/dE_e$ can change. An equation is given to determine the constants of Constable's equation.

## Investigation of Relationship of Catalytic Activity of Certain Semiconductors to the Width of the "Forbidden" Zone

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Decomposition of isopropyl alcohol adsorbed on a semiconductor surface was studied at low pressures and temperatures of 50° to 320°, using the following semiconductors: BAs, BP, GaAs, GaAs·$Ga_2Se_3$, GaAs·3$Ga_2Se_3$, GaSb, GaSe, GaTe, InAs, InSb, $In_2Te_3$. In the majority of the cases, decomposition of the alcohol is via dehydrogenation. The results of this study are compared with the earlier ones, by the same investigators, covering decomposition of isopropyl alcohol on GdS, CuBr, $Ga_2Se_3$, $Ga_2Te_3$, Ge, ZnO, ZnS, ZnSe, and ZnTe. The comparison shows that catalytic activity decreases with increasing width of the "forbidden" zone. At the same time, a decrease in the rate constant may occasionally be due to a decrease in $k_0$ rather than to an increase in E. The first relationship may, in turn, be due to catalysis by the semiconductors on the point of transition from the region of conductivity by impurities to that of inherent conductivity.

The conditions are described for occurrence of the compensating effect on catalytic semiconductors, i.e. for a parallel change of E with log $k_0$.

## Relationship of Catalytic Activity of Copper Oxide to the Thermo-EMF Distribution on Its Surface

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The distribution of thermo-emf was studied on the surface of a tableted copper oxide catalyst. The distribution of thermo-emf follows the normal law. In decomposing hydrogen peroxide over the copper oxide catalyst, a correlation was uncovered between its distribution function and catalytic activity parameters.