Effect of Diffusion on Energy Transfer in Liquid Organic Scintillators

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A mathematical model is described to determine for solutions the effect of diffusion on the dipole-dipole mechanism of energy transfer. The resulting correlation enables to calculate the energy transfer rate constant at given values of the "critical interaction distance" between the molecules, the life-spans of the interacting donor molecules, and the diffusion coefficients of the molecules in each solution.

A study of the effect of viscosity on sensitized luminescence of liquid scintillators is summarized in some detail.

Investigation of Low Temperature Radiolysis of Simple Aromatic Compounds with the Aid of EPR and Mass Spectrometric Methods

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The yields of the radicals, G_R, and of the hydrogen, G_{H_2}, in low temperature radiolysis of benzene, diphenyl, and of some derivatives of these two compounds—were determined with the aid of the EPR and mass-spectrometric methods. The results show that for aromatic compounds the G_R values are appreciably greater than the G_{H_2}. The observed disparity between the G_R and G_{H_2} values for the substances investigated is explained by occurrence of typical to aromatics secondary reactions of the hydrogen atom addition at the double bonds of the aromatic ring.

Effect of Additives on Physico-Chemical Properties of Solids: Effect of Pb^{++} and $Co_3^{=}$ Additives on Some of the Properties of Silver Azide

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Addition of Pb^{++} and $CO_3^{=}$ to silver azide (AgN_3) changes some of its properties. Thus, addition of Pb^{++} increases the photochemical stability and dielectric strength of the azide and decreases its electroconductivity and light absorptivity in the wavelength range of 2,200–3,400 A. Addition of $CO_3^{=}$ produces the opposite changes. The thermal and radiative stabilities of AgN_3 are not noticeably altered by introduction of these additives.

The observed effects are explained in terms of the nature of the lattice defects produced by introduction of these additives and of characteristics of the mechanisms of thermal decomposition and photolysis of silver azide.

Kinetics of Reduction of Tin Dioxide by Carbon Monoxide

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The continuous reduction kinetics of three different samples of tin dioxide by carbon monoxide were studied at temperatures of 500°–1000°.

The SnO_2 reduction kinetics can be expressed by the equation, $1-(1-\alpha)^{1/3} = kt$, assuming that specific velocity of spherical particles remains constant. The relation between SnO_2 reduction rates and CO pressures is expressed by the equation, $k = k'p_{CO}^{n}$. Apparent activation energy values for the three samples tested varies between 26 and 42 kcal/mol.

Studies of properties of tin monoxide at 300°–1,000° show that at temperatures above 460° solid SnO disproportionates into Sn and SnO_2.

The results also show that volatilization of tin occurring during reduction of SnO_2 is tied to the formation of gaseous tin monoxide as an intermediate product.

Use of EPR Method in Studies of Properties of Irradiated Ammonium Perchlorate

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The properties, accumulation, and recombination of paramagnetic centers were investigated at temperatures of 150°–400°K. These centers were produced by ionizing radiation in pure ammonium perchlorate, NH_4ClO_4, and in the perchlorate with added CaO, MnO_2, and $KMnO_4$. A relationship exists between the properties of the radicals produced in irradiating NH_4ClO_4 and those formed by thermally decomposing this compound.

Reaction Kinetics of Heterogeneous Catalyses

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The merits of a certain generalized approach to characterize kinetics and mechanism of hetero-