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Unidimensional Model of Reaction of Diatomic Radicals With Solid Surfaces

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The exchange energy between diatomic radicals and a solid surface was analyzed with the aid of a unidimensional mathematical model based on a harmonic approximation. A relationship was established between the critical dissociation energy of the radicals and their energy of bonding with the "wall." The results show that well potentials have practically no effect on the energy transfer from a diatomic radical to a solid. The probability of dissociation of diatomic molecules was evaluated in "one-point" adsorption.

Phenomenology of Atomic Oxygen Flames

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For atomic oxygen flames a correlation was established between conversion and the ratios of the initial reaction rates, W, of atomic oxygen to the critical auto-heating rates, W_{crit}. The conversion increases with increasing ratio values. Formation of atomic flames and the extent of conversion within them can be explained in terms of the limiting thermal phenomena.

The Upper Ignition Limit in Fluorine-Hydrogen Reaction

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In fluorine-hydrogen reactions the upper limit of ignition varies with pressure. It is concluded that the reaction proceeds along a branched-chain route. Apparently, the branching is associated with the dissociation of the fluorine due to oscillating energy of the excited HF molecules.

Photochemical Oxidation of Propane in Presence of Cl_2

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The nature of the initiators has but little effect on the mechanism of oxidation of propane when the reaction is photoinitiated by excited atomic Hg or by decomposition of NH_3, H_2S, and Cl_2. In the case of Cl_2, some decrease in formaldehyde yield is attributed to competition between the iso-C_3H_7 and the n-C_3H_7 radicals in the reactions below:

$$C_3H_7 + Cl_2 \rightarrow C_3H_7Cl + Cl \qquad (2)$$

$$C_3H_7 + O_2 \rightarrow C_3H_7O_2 \qquad (3)$$

At a temperature of 180°, the ratio k_2/k_1 is 13. Since n-$C_3H_7O_2$ radical is present in only relatively small concentrations, the ratio of the reaction constants, k_2/k_1, can be evaluated for the reactions below:

$$\text{iso-}C_3H_7O_2 + C_3H_8 \rightarrow \text{iso-}C_3H_7O_2H + C_3H_7 \qquad (4')$$

$$\text{iso-}C_3H_7O_2 + CH_3CHO \rightarrow CH_3O \qquad (5')$$

Here, $k_2/k_1 = 10^{24.3} \exp\left(\frac{-13{,}200 \pm 1{,}000}{RT}\right)$ molecules/cm^3.

Use of Chemiluminescence Technique in Study of Decomposition of Azo-bis-Isobutyronitrile in Presence of Oxygen

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The quantities of decomposed azo-bis-isobutyronitrile (AIBN) and of the O_2 reacting with the radicals produced in the decomposition were compared by observing the "oxygen decreases" due to the chemiluminescence. The cyanisopropyl radical was found to react faster with the O_2 than