JOURNAL OF CATALYSIS 3, 198–200 (1964)

Abstracts from Kinetics and Catalysis, Academy of Sciences of USSR, Vol. IV, Issue 5, pp. 657–661, Sept.–Oct., 1963

A Theory of Low Temperature Interaction of Atomic Hydrogen Formed in Gaseous Phase with Solid Olefins

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Interaction of atomic hydrogen, which is produced in gaseous phase, with solid olefins was determined by formal analytical methods. Individual partial reaction mechanisms were also investigated. Equations were derived to correlate rate constants, k_1 and k_2, of the reactions, $Ol + H\cdot \xrightarrow{k_1} R\cdot$ and $H\cdot + H\cdot \xrightarrow{k_2} H_2$, with the atomic hydrogen coefficients of diffusion in the hydrocarbons studied. These correlations were based on the experimental data of the effect of thickness of the paraffinic layers formed over the olefins upon their hydrogenation rates.

Radiative Oxidation of Heptene-1

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A study of radiative oxidation of heptene-1 with molecular oxygen shows that initial formation of peroxide and carbonyl compounds via a chain mechanism occurs at a low temperature of 8°. The effective activation energy of formation of these products from heptene-1 is lower than from *n*-heptane (3.8 ± 0.5, for $C_7^{=} - 1$; 6.0 ± 1.0 kcal/mol, for n-C_7). Radiative oxidation of *n*-heptane-heptene-1 mixtures results in appreciable increase of oxidized product yields, the greatest sensitizing action occurring at heptene-1 concentrations under 10 mole per cent. The sensitizing effect is associated with the transfer of energy from *n*-heptane to heptene-1.

Air Oxidation of Uranium Dioxide in Presence of Added Carbonates and Oxides

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This study shows that added alkali metal carbonates and the oxides: ThO_2, ZrO_2, TiO_2, U_3O_8, exert appreciable effect upon the rates of UO_2 oxidation with air at various stages of the process. These stages are marked by significant changes in crystalline structure of the oxidate. Some of these additives facilitate the formation and growth of new phases; others, on the contrary, prevent their occurrence by forming chemical compounds with the nuclei of new phases.

These additives are also effective when oxidation of UO_2 is carried out with limited amounts of adsorbable oxygen.

A Mechanism of Thermal Stabilization of Silver Oxalate by Addition of Cadmium Ions

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Addition of cadmium ions in concentrations of 0.1–0.5 mole % decreases conductivity of ionized $Ag_2C_2O_4$, whereas additions of this ion in amounts of 1.5–10 mole % has the opposite effect on conductive properties of this salt. A discussion of probable reasons for this effect includes possible recombination of the interstitial Ag^+ cations with the cationic vacancies. The character of the reflection and adsorption spectra in the visible and ultra-violet regions is not altered by the additive.

The rate of thermal decomposition of $Ag_2C_2O_4$ decreases on addition of ionic cadmium in the amounts stated. The observed decrease of the rate is regarded as a consequence of the effect of changes in the concentration of the cationic vacancies upon the elementary thermal decomposition stages of the process.

Formation of Radicals in Low Temperature Radiolysis of Toluene

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The EPR spectra of the radicals formed in irradiation of frozen $C_6H_5CH_3$ and $C_6D_5CH_3$ by high velocity electrons were compared with the EPR spectra of phenyl, benzyl and cyclohexadiene radicals obtained in earlier studies. The