

Thermogravimetric Investigation of Mechanism and Kinetics of Decomposition of 50/50 Mol % Mixture of Ca and Li Acetates

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A thermogravimetric study of thermal decomposition of a 50/50 mol per cent mixture of acetates of Ca and Li was carried out at temperatures of 341°–388°. The results show that the mixture decomposes at a faster rate than its pure components. A 50/50 mixture of acetate of one metal and of carbonate of the other metal decomposes somewhat faster than the mixture of the two metal acetates. The decomposition rate curve of the 50/50 mixture of the two metal acetates has two maximum points. The value of the temperature coefficient for thermal decomposition of this mixture equals that for catalytic decomposition of $\text{HC}_2\text{H}_3\text{O}_2$ over a CaCO_3 - Li_2CO_3 catalyst.

"Step-wise" Recombination of Free Radicals in Irradiated Organic Compounds: Experimental Studies of the Recombination Kinetics

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A study of kinetics of "step-wise" recombination of free radicals in a solid phase was carried out, using a number of organic compounds to illustrate the reaction mechanism. The results show that kinetic stoppage of the recombination process is a phenomenon which is common to substances with widely different structures. In all cases the concentration of "stable" radicals usually decreases lineally with a temperature rise. With phenol, the rate to reach a "quasi-stationary" concentration markedly increases upon increasing the rate of heating-up the sample to a desired temperature.

Electroconductivity of Aluminosilicate Cracking Catalysts

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A study was made of the effect of temperature on the electroconductivity of aluminosilicates of different composition and of pure alumina. The

results show that electroconductivity of aluminosilicates varies greatly with the composition and that the catalysts with 30% Al_2O_3 – 70% SiO_2 content have greatest conductivity.

An investigation of the effect of added alkali metal ions shows that the electroconductivity increases sharply with the added ion concentration.

A discussion is presented covering the nature of electroconductivity in aluminosilicate catalysts and the relationship between electroconductivity and catalytic activity.

Effect of Different Ionizing Radiations on Catalytic Dehydration of *n*-Decyl Alcohol and on Isomerization of α -Decene

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An investigation of the effect of different types of ionizing radiations on the rates of dehydration of *n*-decyl alcohol and isomerization of α -decene shows that X-ray pre-irradiation of Al_2O_3 increases conversion of the alcohol. Continuous X-ray irradiation of the reaction system is particularly effective.

Pre-irradiation of alumina in a nuclear reactor using slow neutrons and γ -rays of CO^{60} , decreases the alcohol dehydration rate. Irradiative pretreatment of alumina by fast neutrons has no effect on the rate of conversion of the alcohol over the irradiated catalyst.

Effects of Surface Coverage and Dehydration on Changes in Infra-Red Spectrum of Benzene Adsorbed on Aerosil

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Changes in the spectra of benzene and hydroxyl groups adsorbed on aerosil were investigated. Displacement of the adsorption band of the free hydroxyl groups of aerosil depends on the surface coverage. In adsorption of benzene, the adsorption band of extra-planar deformational oscillation of a CH group in benzene sustains the greatest change.

At low hydroxyl group coverages of aerosil surface, the state of the C_6H_6 molecules differs drastically from their liquid and gaseous states. At high surface coverages the state of the C_6H_6

molecules approaches that of liquid C_6H_6 ; on highly methoxylated and dehydroxylated adsorbing surfaces the C_6H_6 molecules approach gaseous state.

Electroconductivity and Adsorptivity of Gases on Semi-Conductors of Zinc Blende Structural Type

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Adsorption of oxygen and hydrogen gases was determined volumetrically, using the following isoelectric compounds: Ge, GaAs, ZnGe, CuBr. For each substance, the temperature of initial activated adsorption was found to be directly related to the corresponding range of unfavorable adsorption conditions. Electroconductivities of Ge, GaAs, and CuBr in hydrogen and oxygen were determined at various temperatures and pressures. Electroconductivity of each substance tested was found to depend upon its physical properties, and the contact time and pressure of each gas. Ideas are presented regarding the nature of chemisorptive bonding of the gaseous particles with the surface of the semi-conductors studied.

Relationship Between Catalytic and Electronic Properties of Semi-Conductors: Decomposition of Nitrous Oxide on Thin Copper Oxide Films

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Changes in the electron work function with reaction conditions were determined in decomposition of nitrous oxide on CuO films. At a room temperature the gas is adsorbed without decomposition. Adsorption of the gas on CuO films decreases the work function. The electron work function is at the minimum in the reaction over the films preheated in N_2O atmosphere to temperatures of 260°–280°. Initial decomposition of nitrous oxide occurs in this temperature interval.

The test-samples with relatively higher initial work function values have higher catalytic activity. Heating the more active catalyst samples in N_2O atmosphere produces greater change in the work function values than with the less active catalysts.

A mechanism is proposed for decomposition of nitrous oxide over copper oxide catalysts.

Hydrogenative Condensation of Olefins Over a Cobalt/Clay Catalyst in Presence of Oxygen as Reaction Initiator: Conversion of Butene-1

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In presence of oxygen as the reaction initiator, butene-1 condenses over a cobalt/clay catalyst to form liquid aliphatic hydrocarbons. For the reaction to proceed, hydrogen must be present. The greatest yields of liquid products are obtained at reaction temperatures of 100°–140° and initial butene-1/hydrogen ratios of 1.5/1.0. Concentration of the added oxygen in the optimum reaction mixture is 1–2 per cent.

The oxygen-initiated catalytic condensation of butene-1 apparently proceeds via a radical-chain mechanism, which closely parallels that of hydrogenative polymerization of this olefin over the same catalyst in presence of carbon monoxide as the initiator.

Infra-Red Spectroscopic Studies of Transformations of Isomeric Cresols Over a Ni/Al₂O₃ Catalyst

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A study was made of the infra-red spectra of cresol isomers chemisorbed on a Ni/Al₂O₃ catalyst. With m-cresol, physical adsorption of the molecules is observed. With o- and p-cresols, the material chemisorbed on the catalyst surface is a complex substance, indicating possible splitting of the aromatic rings by the catalyst.

Kinetics of Catalytic Dehydrogenation of Alcohols Over Germanium

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An investigation of catalytic dehydrogenation of ethyl and isopropyl alcohols was carried out, using samples of powdered germanium with different conductance and specific electroconductivity properties. The results show that compared