

diethyl ester as an example. The results show that the reaction is of the radical type and of  $3/2$  kinetic order.

The bromination rates of a number of derivatives of vinylphosphinic acids were determined. The study shows that the rate constants are defined by Hammett's equation, when using the earlier-determined values of  $\sigma$  for the phosphorus substituent.

#### $\gamma$ -Radiolysis of Methanol

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The action of  $\gamma$ -radiation of  $\text{Co}^{60}$  on methyl alcohol was determined. The results show that the yields of hydrogen, methane, and of the sum of ethylene glycol and formaldehyde increase with the temperature. Activation energy of the reaction is 0.65 kcal/mol. The yields of dimethyl ether and of formaldehyde decrease with increasing reaction temperature.

Addition of certain compounds to methanol being irradiated appreciably increases formaldehyde yields.

The results obtained are explained in the light of the concepts for diffusion processes.

#### Formation and Reactions of Free Radicals in Ultraviolet Irradiation of Organosilicones: Silazanes

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EPR and mass spectral analyses were made of the gaseous products of interaction of the radicals formed in irradiation by ultraviolet light of certain silazanes at a temperature of  $77^\circ$ . The results show that formation of the free radicals occurs by rupture of the Si—C, Si—H, and C—H chemical bonds.

#### Kinetics of Hydrogen Adsorption on $\text{Al}_2\text{O}_3$ by $\gamma$ -Irradiation

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A study was made of kinetics of radiative chemisorption of hydrogen gas on  $\gamma\text{-Al}_2\text{O}_3$ . Equations

were derived which satisfactorily describe the reaction mechanism. The number of surface centers active in the chemisorption was determined. A mechanism is suggested for the chemisorption of hydrogen at a temperature of  $\sim 300^\circ\text{K}$ .

#### Electronic State of Catalysts in Adsorption and Catalysis: Mechanism of Hydrogenation of Carbon Monoxide Over a Nickel Catalyst

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Changes in the contact potential differences (CPD) of a nickel-chromia catalyst were determined in separate and simultaneous adsorption of  $\text{H}_2$  and CO at the conditions directly preceding the initiation of the catalyzed reactions; the changes in CPD were also determined during hydrogenation of carbon monoxide. The results show that for hydrogen adsorption the surface charge of a catalyst sample subjected to vacuum pretreatment with hydrogen differs from that of an untreated sample.

The action mechanism of the nickel-chromia catalyst was examined in the light of the experimental results of the study. A scheme for hydrogenation of CO over this catalyst is proposed.

#### Photosorption and Photodesorption of Oxygen on Zinc Oxide: Experimental Conditions to Determine Photosorptive Properties of Muffle-Oxidized Zinc

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The study shows that after a thorough purification by preheating in oxygen, zinc oxide photosorbs oxygen exclusively. Reproducible conditions were determined for the photosorption, after saturating the catalyst by briefly heating it at a temperature of  $300^\circ\text{--}400^\circ$  in vacuum or in oxygen atmosphere. The characteristic spectra were determined for the visible and near-ultraviolet regions.

By way of illustration, the results for muffle-oxidized zinc oxide show that at pressures in the range of  $1 \times 10^{-3}$  to  $1 \times 10^{-2}$  mm Hg, the amount of photosorbed oxygen is independent of the pressure but is clearly proportional to the exposure time.

Prephotoactivation of the adsorbent was uncovered.