criteria of photoadsorption and photodesorption) upon semiconductors. The sign of the effect is shown to be dependent upon: (1) properties of the adsorbate and of adsorbent; (2) previous history of the samples subjected to the exposure; and (3) experimental conditions (temperature, pressure). Existing available experimental data are analyzed and interpreted in the light of the theory offered in this paper.

Investigation of Homomolecular Exchange of Oxygen in Presence of Metal Oxides of the Fourth Period. I. Kinetics and Mechanism of the Exchange

By A. P. DZEESYAK, G. B. BORYESKOV, AND L. A. KASATKEENA

Presented are determinations of the reaction rates, apparent activation energy, and the order of the reaction for homomolecular exchange of oxygen, $O_2^{16} + O_2^{18} = 2O^{16}O^{18}$, in presence of the oxides of the transition metals of the fourth period.

It is shown that the order of activity of the oxides investigated for homomolecular exchange is as follows: $TiO_2 < V_2O_5 < Cr_2O_3 < ZnO < Fe_2O_3 < CuO = NiO < MnO_2 < Co_3O_4$.

The rate of homomolecular exchange is equal to the initial rate of the isotopic exchange between molecular oxygen and the oxygen of an oxide studied. Discussion is presented of possible mechanisms of exchange.

Investigation of Adsorption of Water Vapor on Silica Gel Surface by Nuclear Magnetic Resonance (NMR)

By V. I. KVLEEVEEDZEY, N. M. YEVSKAYA, T. C. YEGOROVA, V. F. KEESYELYOV, AND N. D. SOKOLOV

Investigation was made of the types of signals produced by nuclear magnetic resonance of the protons of hydroxyl groups which are formed by the water adsorbed on silica gel surface. The results show absence of water molecules on the surface of a sample under vacuum at 200°C. In the initial adsorption stage there were observed sharp diminutions of the width of the band and of the secondary moment. These changes in the signals of NMR are in agreement with the direction of the curves for the differential heats and entropies of adsorption. The results obtained are compared with the data for infra-red spectra. Discussed is the possibility of interaction of water molecules with the surface of silica by the coordinate and hydrogen bonding.

Differences in Catalytic Activities of Platinum and Palladium in Conversions of Cyclohexene and Cyclohexadiene

By V. M. GRYAZNOV, V. D. YAGODOVSKII, E. A. SAVYELYEVA, AND V. I. SHEEMOOLEES

The thin layers of platinum and palladium, which were prepared under identical conditions, exhibit sharply different catalytic properties. Dehydrogenation of cyclohexene and of 1,3-cyclohexadiene is the principal reaction over the Pt layer; on the other hand, redistribution of hydrogen takes place over the Pd layer. Capacity of palladium to adsorb much greater amounts of hydrogen is offered as the explanation.

Energies of Bonding of Atoms of Carbon, Hydrogen, and Oxygen of Organic Molecules with Yttrium Oxide

By A. A. TOLSTOPYATOVA, I. R. KONYENKO, AND A. A. BALANDIN

The values of energies of bonding of carbon, hydrogen, and oxygen atoms of organic molecules with yttrium hydroxide, $Y_2O_3 \cdot nH_2O$, were determined by a kinetic method. A discussion is presented about the cause for carbonization in conversions of alcohols and of hydrocarbons over $Y_2O_3 \cdot nH_2O$; the reason for poor dehydrogenation characteristic of this catalyst is also discussed. A relationship is noted between the magnitudes of the carbon and hydrogen energies of bonding with a catalyst and the ability of various oxides to catalyze dehydrogenation of hydrocarbons. The experimental values of bond energies obtained in this study are used to substantiate the various conclusions made.

Liquid Phase Catalytic Oxidation of Organic Compounds Over Noble Metals. III. Oxidation of Ethylene Glycol to Glyoxal

By I. I. YOFFEY, N. V. KLEEMOVA, AND A. G. MAKEYEFF

Liquid phase catalytic oxidation of ethylene glycol over platinum and platinum-palladium catalysts yields glyoxal in up to 15% yields. Other oxidation products formed in the process are glycolic and formic acids, formaldehyde, and glycol-aldehyde.

Also investigated were effects of some of the kinetic parameters upon oxidation of ethylene glycol to glyoxal. Solubility of various carriers was also investigated under the conditions employed in this reaction. The results show that carbon and aluminum oxide are the more stable carriers.