Ultraviolet Spectroscopic Study of Interaction of Aromatic Molecules with Cationized and Decationized Zeolites

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The spectra of aromatic hydrocarbons adsorbed on cationized NaX- and decationized Y-zeolites were studied by the ultraviolet spectroscopy. The spectra of the following aromatics were investigated: benzene, toluene, phenol, aniline, pyridene, and nitrobenzene. The directional consistency of the spectral shifts and the relatively small differences in the shift magnitudes, which are observed with the aromatics adsorbed on the hydroxylated aerosils and the cationized zeolites, point to similarity of the nature of interaction of the aromatics with the hydroxyl groups of the aerosils and with the exchangeable cations of the zeolites. The changes in the spectra of the molecules containing the oxygen and nitrogen atoms with free electron pairs indicate weakening of the bond between the π-electrons of the aromatic ring and the free electron pairs. The adsorption on decationized Y-zeolites results in the formation of coordination-bonded molecules and ions on the surface. Irradiation by ultraviolet light accelerates this process.

Optical and EPR Spectral Studies of Structure of the Adsorption Centers of Chromia-Alumina Catalysts

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The surface structures of supported chromia-alumina catalysts were determined by means of EPR and reflected optical spectroscopy techniques. The results show that surface of the catalysts pretreated at high water-desorption temperatures contains coordination-unsaturated Cr^{+3} ions in the square-pyramidal coordination arrangement with Symmetry C_{4v}. These ions produce characteristic optical spectra and are the active sites for adsorption of water, methanol, and ammonia.

The Secondary Ion-Ion Emission Studies of Ammonia Decomposition Over an Iron Catalyst

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The results of secondary ion-ion emission studies of ammonia decomposition over a pure iron catalyst show that the decomposition occurs only when the catalyst surface is free from the iron oxide impurities. Based on the experimental data, a mechanism is proposed to describe the process of ammonia decomposition over the iron catalyst. The hypothesized reaction mechanism is completely identical with that of NH_3 decomposition over a platinum catalyst, which was described in an earlier paper.

Radiative Chemisorption of Oxygen on γ-Al_2O_3

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A study of kinetics of radiative chemisorption of oxygen on γ-Al_2O_3 was carried out at a temperature of 20°. The results show that the initial reaction rate is independent of the oxygen pressure. A simple scheme is proposed to describe the chemisorption process. The irradiation-chemical yield of the adsorption centers was determined to be 4 per 100 ev and the ratio of the chemisorption rate constant to that of the rate of extinction of the active centers was found to be $(3.66 \pm 0.26)(10^{-16})$ cm^3.

Brief Communications

Reactions of Atomic Hydrogen in an $H_2O + H_2SO_4 + FeSO_4$ System: The Reactions with Saturated Organic Compounds

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The EPR studies of reaction of atomic hydrogen with molecules of alcohols and organic acids were made at temperatures near 90°K. The results show that atoms of the atomic hydrogen can abstract hydrogen atoms from the alcohol and organic acid molecules, with resulting formation of the corresponding radicals.

Behavior of Metal Oxide Additives in Thermal Decomposition of Ammonia Perchlorate

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The micro-thermoreactor studies of ammonia perchlorate decomposition in the presence of admixtures of CdO, ZnO, and PbO (1–5% by wt) were carried out at a temperature of 300°, with concurrent recording of the infrared spectra. The