geneous catalytic reactions are considered, using simple processing stage models based on Bodenstein Principle and graphical solution methods.

Usefulness of the magnetochemical data is discussed as a possible means to sharpen the accuracy and intensity of chemical reaction mechanisms.

Decomposition of ammonia over tungsten and iron catalysts and oxidation of ethylene over a silver catalyst are discussed to illustrate the concepts of this work.

Effect of Spinel Formation Upon Catalytic and Electrical Properties of Nickel Oxide–Chromium Oxide Systems

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Magnetic and electrical properties of nickel oxide-chromium oxide mixtures were determined after air calcination at various temperatures and after treatment with formic acid. Catalytic activity of these oxide mixtures was determined. Based on the initial rate measurements, no specifically active state was found for decomposition of formic acid.

Catalytic decomposition of HCOOH over metallic nickel on oxides of nickel and chromium was determined as a function of the support calcination temperatures. The catalyst with the smallest activation energy is nickel on the supports precalcined at 800°. This observation and the study data of the electrical properties of the oxide mixtures emphasize the singularity of the state originating during the spinel formation stage.

Properties of Nickel Oxide, Produced by Decomposition of Nitrate Salts, and of Its Alloys with Lithium and Iron

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Samples of pure nickel oxide and of its alloys with lithium (0.17–5.5 atom %) and iron (0.1–3.0 atom %) were prepared by calcination of nickel nitrate at temperatures of 500°–1,000°. Excess oxygen in the samples was determined immediately after air-calcination and after vacuum desorption of the oxygen at a temperature of 400°. The amounts of desorbable oxygen were determined for the surface and the sub-surface layers; the determination also included the excess oxygen in the intra-crystalline lattice of nickel oxide. The results obtained shed light upon the mechanism of lithium diffusion into the intercrystalline lattices. The results of electroconductivity measurements of the samples in air and in vacuum are also listed.

Activity, Structure, and Electrical Properties of Mixed Vanadium Catalysts

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Activities of the following mixed oxides to catalyze oxidation of benzene to maleic anhydride were determined: $V_2O_5 + MoO_3$; $V_2O_5 + Cr_2O_3$; $V_2O_5 + Co_2O_3$; $V_2O_5 + P_2O_5$; $V_2O_5 + Li_2O$; $V_2O_5 + Rb_2O$. The structures of these mixed oxide catalysts were determined by the EPR and roentgenographic methods. The electron work functions of these mixed oxides were evaluated. A relationship was established between the activities and the structural and electronic properties of these catalytic complexes. The V^{+4} ion-containing solid solutions in a crystal lattice of V_2O_5 show the greatest activity and selectivity. The chemical compounds produced on mixing these oxides had somewhat smaller activities. Activities of the catalysts increase with increasing values of their work functions.

A Mechanism of Catalytic Hydrocarbon Oxidation Over Cobalt Salts

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The kinetics of oxidation of methyl oleate, diphenyl methane, cyclohexene, cumene, and n-decane were studied, using a solution of cobalt acetate in glacial acetic acid as the catalyst. Except for n-decane, these oxidation reactions follow identical kinetic principles. Also, the results show that in oxidation of methyl oleate and of diphenyl methane, the catalyst plays active role in the reaction initiating stage only, that of interaction with the hydroperoxide; however, it does not participate in either the promotion or stoppage of the chain reactions.