dividual kinetic variables of the process (the rate constants and the activation energies and entropies) and: composition, X, of the anionic solutions, concentration, MX_2, of the salts used, and the nature of the central ion, M. The reaction was found to be of the first order with respect to both the pheophytins and the salts. A brief discussion of the correlations based on the results of this study is included.

Relationship Between Electronic Structure of Cobalt–Nickel Catalysts and Their Catalytic Properties

R. F. Lavr'yentoveech, M. T. Roosov,
and Yu. N. Art'yukh

L. V. Peesarjevsky Institute of Physical Chemistry of the Academy of Sciences of Ukrainian SSR

The experimentally-determined data of catalytic properties of cobalt-nickel alloys show that specific catalytic activities, electron work functions, and numbers of the unpaired *d*-electrons change with changes in the chemical composition of these alloys.

Kinetics of Benzene Hydrogenation Over a Nickel Catalyst: Reactions in the Kinetic Region

Yu. S. Snagovsky, G. D. L'yubarsky,
and G. M. Ostrovsky

L. Ya. Karpov Physico-Chemical Institute

A review of the literature on hydrogenation of benzene reveals contradictory results. Possible reasons for the contradictions were examined. The hydrogenation kinetics were determined experimentally in a recycle-continuous unit at widely-different operating conditions. The results show that the reaction order changes with operating temperature due to changes in the adsorption equilibria. Analysis of the information obtained by substitution of pertinent experimental data into the kinetic equations for the feasible reaction mechanisms, resulted in selection of the most satisfactory scheme of the reaction course. The calculations to select the optimum scheme were carried with the aid of linear programming methods and electronic computers.

Catalytic Properties of NiO in Homomolecular Oxygen Exchange Reactions

V. J. Gorgorakee, G. K. Bor'yeskov,
and L. A. Kasatkeena

D. I. M'yend'yel'yeyev Chemico-Technological Institute in the City of Moscow

The homomolecular isotopic oxygen exchange reaction, $O_2^{18} + O_2^{18} = 2O^{16}O^{18}$, was investigated over "pure" NiO and over the NiO containing admixed Li and In at temperatures of 25° and 275°–400° and oxygen pressures of 10–160 mm Hg. The results show that at the temperatures studied NiO is catalytically active and that the additives used materially alter its catalytic properties. The initial rate of the exchange reaction is significantly greater at a room temperature than at the elevated temperatures.

Kinetics of Cyclohexane Dehydrogenation Over Chromic Oxide in a Non-Gradient System

V. S. Hadjee-Kasoomov, S. L. Keeperman,
G. V. Eesagool'yantz, and A. A. Balandeen

N. D. Z'yeleensky Institute of Organic Chemistry of the Academy of Sciences of USSR

The results of a study of kinetics of cyclohexane dehydrogenation over chromic oxide in a recycle-continuous unit show that the reaction is of the first order and that its activation energy is 41.5 kcal/mol. The results obtained are discussed on the basis of a two-step scheme proposed for the process.

Effect of System pH on Kinetics of Hydrogenation Reactions Over a Palladium Catalyst

S. M. R'yeshetneekov and
A. M. Sokol'skaya

S. M. Keerov State University in Kazahsk

The information supplied by the $Pd/BaSO_4$ (5% Pd) "charge" curves at pH of 1.2 and 13.0, leads to the conclusion that energy of the Pd—H bond increases with increasing pH of the reaction system. Compared to Pd-black, the catalyst studied contains a greater amount of adsorbed hydrogen and a smaller amount of dissolved hydrogen.

The rates of hydrogenation of hexene-1 and of cyclohexene reactants, which alter but little the catalyst potential, are at the maximum in an acidic media, the hydrogenation being realized via the weakly-bonded hydrogen.

In hydrogenation of phenylacetylene and nitrobenzene, which strongly displace the catalyst potential, the system pH has no effect on the reaction rates.

Homomolecular and Isotopic Oxygen Exchange on Gadolinium Oxide

L. A. Sazonov, V. D. Sokolovsky,
and G. K. Bor'yeskov

Institute of Catalysis of Siberian Division of the Academy of Sciences of USSR

Catalytic activity of gadolinium oxide in isotopic and homomolecular oxygen exchange