

thesis reactions. It was established that catalytic activity of these alloys depends upon their phase composition. The results also confirm a hypothesis as to the role of these polymorphic preparations in the mechanism of heterogeneous catalytic processes.

#### Interaction of Oxygen with Complex Organic Compounds of Cobalt

By G. M. PANCHENKOV AND  
A. M. TOLMACHOV

*M. V. Lomonosov State University in Moscow  
Department of Chemistry*

Presented are the results of a study covering the kinetics of interaction of oxygen with complex organic compounds of cobalt, namely, bis-(*N,N'*-disalicylalethylenediamine)- $\mu$ -aquodnicobalt and bis-(*N,N'*-di-(3-nitrosalicylal)-ethylenediamine)- $\mu$ -aquodnicobalt. It was established that raising the temperature alters the reaction rates in a complex manner and that pressures of 0.5 to 1 atmospheres have practically no effect on the rates. In all of the cases investigated the reaction rates were found to be limited by the diffusion velocities of the oxygen within the crystalline particles of the complexes.

#### Kinetics of Autocatalytic Reactions in Continuous-Flow Processes

By A. P. ZEENOVYEVA AND D. I. OROCHKO  
*The All-Union Institute for Scientific Research  
in Conversion of Petroleum and Gas and in  
Production of Synthetic Fuels*

Various kinetic functional correlations of an autocatalytic reaction were investigated under continuous-flow conditions (at constant pressure). Also, the addition of the reaction products to the raw feed was a complicating condition.

Generalized macrokinetic equations are proposed to calculate the ratios of the raw feed passed and of the raw feed consumed per unit reactor volume, at various concentrations of the recycle products in the raw feed. These generalized kinetic correlations are valid for any concentration of the recycle in the total feed stream, including the cases of ideal displacement and of ideal mixing.

The technique of recycling the product stream is suggested as a possible means to control some of the autocatalytic processes and of the chain conversions, which are characterized by appreciable induction periods.

#### Investigation of Structures of Natural Sorbents By a Dynamic Solution Flow Method

By V. T. BIKOV AND O. E. PRIESNYAKOVA  
*V. L. Komarov Far-Eastern Affiliate  
of the Siberian Division of the Academy  
of Sciences of U.S.S.R.*

Using own dynamic method to adsorb phenol from the stream of its solution in carbon tetrachloride, the authors determined the structural types and specific surfaces of 33 natural and synthetic sorbents.

The structures of natural substances depend on the source and extent of weathering.

#### Mechanism of Catalytic Action of Molybdena-Alumina Catalyst on High Temperature Hydrogenation of 1,3,5-Trimethylbenzene

By A. A. KREECHKO AND L. S. SOVIETOVA  
*The Institute for Mined Fuels of the  
Committee for Fuel Industry*

The results are presented for hydrogenation of 1,3,5-trimethylbenzene at the following conditions: temperature, 520°-700°; pressure, 100 atmospheres; liquid hourly space velocity, 12.5 moles/liter-hour; molybdena-alumina catalyst of commercial grade. A parallel study without a catalyst was also carried out for comparative purposes.

Show that under the experimental conditions employed the basic reactions in converting 1,3,5-trimethylbenzene are demethylation and formation of benzene, toluene, and 1,3-dimethylbenzene. At a temperature of 600°, the conversion is 100% and the yield of benzene is 41.5%. Without the catalyst, analogous results are obtained at a temperature of 700°.

#### Chemical Reactions of Gases With Solids in a Fluidized Bed. II. Reactions in Processes With Fixed Composition of the Gas

By A. L. ROSENAL  
*The Institute for Petrochemical Synthesis  
of the Academy of Sciences of the U.S.S.R.*

An investigation was made of the reactions of fixed composition gases with solids in fluidized beds.

Assuming regularity of moving particles, as would be the case normally, the distribution of probable residence times of the particles were calculated for a model unit with ordinary geometric and hydrodynamic properties. A comparison of these calculations with the published ex-