catalytic activity in decomposition of ammonia. The best structure is characterized by the presence of 2.37–2.40 unpaired d-electrons per atom of the catalyst. Formation of chemical compounds (superstructures) in the alloys results in sharp deactivation of the catalyst.

Catalytic Activity of Manganese Dioxide in Isotopic Exchange of Molecular Oxygen

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A study of kinetics of isotopic exchange in molecular oxygen over manganese dioxide was carried out at temperatures of $-196°$ to $+360°$ and oxygen pressures of 2–240 mm Hg. With the catalyst pretreated in vacuum at temperatures of $350°$ and $550°$, the exchange reaction takes place in a wide temperature range of $-78°$ to $+360°$. At temperatures of $25°–50°$, and higher, activity of the catalyst in oxygen decreases with the onstream time; at temperatures upwards of $200°–250°$, stabilization of its activity is attained very quickly. At low temperatures, activation energy of the isotopic exchange is 3.7 kcal/mol and the order of the reaction with respect to the oxygen is 0.64. At high temperatures, activation energy of the exchange reaction over the catalyst with stationary activity is 18 kcal/mol.

At low temperatures, the exchange in molecular oxygen is not accompanied by isotopic exchange with the oxygen of the manganese dioxide. At high temperatures, the homomolecular exchange reaction takes place via exchange with the lattice oxygen.

Calculation of Reaction Rate Constants in Ammonia Synthesis Over a Reversibly Steam-Poisoned Catalyst in Continuous Flow Reactors

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The equation to describe kinetics of ammonia synthesis over a reversibly steam-poisoned catalyst was integrated for continuous operation at low and high pressures. Convenient calculation methods are described to obtain approximated numerical data. The published experimental data for operation in continuous-flow systems validate reliability of the subject equation at operating pressures up to 350 atm. Based on the kinetic equation, a discussion is presented regarding the

effect of steam concentration in a reaction mixture on the extent of the catalyst poisoning.

Dealkylation of n-Amylbenzene Over a Silica-Alumina Catalyst

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The results of cracking of n-amylbenzene over a commercial Houdry-type silica-alumina catalyst show that two side-reactions: dehydrocyclization and splitting of the carbon-carbon bond, occur concurrently with the principal reaction of splitting off of the alkyl group from the benzene ring. Apparent activation energy of the dealkylation reaction is 32 kcal/mol.

Kinetics of Dehydrogenation of Cyclohexane in a Non-gradient System

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Dehydrogenation of cyclohexane at low conversion levels was investigated in a recycle-continuous operation, using a nickel/zinc oxide catalyst at temperatures of $263°$ and $275°$ and cyclohexane partial pressures of 100–110 mm Hg, based on the concentration of this component in the cyclohexane-benzene-hydrogen charge mixture.

The reaction rate, w, is not decreased by addition of the outside hydrogen. At the conditions employed, the rate is expressed by the equation for reactions of the zero order and also by the equation, $w = kP_{C_6H_{12}}{}^{0.5}$. On the other hand, the reaction rate is retarded by addition of benzene to the cyclohexane feed. During the initial period of operation at the C_6H_6 partial pressures of 42–210 mm Hg, the reaction rate is expressed by the equation, $w = P_{C_6H_{12}}/P_{C_6H_6}{}^{0.5}$. At temperatures of $246°–275°$, the added hydrogen does not affect the reaction rate-temperature correlation.

The mechanism of the reaction is considered in the light of the experimental results and of the concepts as to the reaction course over a non-homogeneous catalytic surface. From the latter viewpoint, the reaction is regarded to proceed via two slow stages, with the alteration of the reaction mechanism occurring upon addition of sufficient amounts of benzene.