Kinetics of Isotopic Exchange Between Gaseous Hydrogen and the Hydrogen Dissolved in Palladium

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The effects of temperature and pressure on the rate of isotopic exchange and the partition coefficient were determined for a gaseous hydrogen-hydrogen dissolved in palladium system. The results show that at temperatures of −20° to +100°, the heat of the isotopic exchange and activation energy of the reaction remain constant at 1,080 and 7,270 cal/mol, respectively. The value of the rate constant of the exchange reaction increases linearly with pressure of the hydrogen over the palladium. At pressures below 200 mm Hg, the magnitude of the partition coefficient changes markedly with changes in the hydrogen pressure.

Contact Potential Difference of Cerium Dioxide in the Presence of O_2, $O_2 + CO$, and $O_2 + CO_2$

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Contact potential differences (CPD) of cerium dioxide were determined in oxygen and in mixtures of O_2 with CO and with CO_2. The decreases in the CPD values observed on heating are attributed to filling of the assumed surface levels by the electrons. With the $O_2 + CO$ mixtures, i.e. in oxidation of the CO, these levels are closer to Fermi level than with pure oxygen — although during the initial period the situation is reversed and the values of the levels increase. The concentration of the levels is not altered by admixing CO to the oxygen.

Kinetics and Probable Mechanism of Oxygen Photosorption on Zinc Oxide

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With the aid of the experimental data, an expression was developed to describe the kinetics of oxygen photosorption on thick beds of powdered zinc oxide. The conditions were determined at which this expression is valid. The importance of taking into account the effect of the bed height is stressed.

An equation was derived to describe the photosorption kinetics in thin beds of the adsorbent exposed to light of uniform intensity. A hypothesized concrete model of the photosorption mechanism is described and discussed.

Oxidation of Methylacetylene Over Copper Catalysts

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The novel study of methylacetylene oxidation in the gas phase was carried out over various copper catalysts. The results show that the oxidation is characterized by destruction of the skeletal carbon structure via a heterogeneous-homogeneous reaction mechanism. The authors hypothesize that oxidation of methylacetylene over the copper catalysts occurs mainly via the adsorption at the triple carbon-carbon bond and not at the C—H bond of the methyl-containing group, as is the case with propylene.

The products of the methylacetylene oxidation were identified by the gas-liquid and the thin-film chromatographic methods and by certain other techniques.

Conversion of Hydrocarbons Over Various Hydrogenation Catalysts

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The study of conversion of isopentane, *n*-hexane, n-nonane, and cyclohexane over certain dehydrogenation catalysts shows that the ratio of the dehydrogenation-to-aromatization properties depends upon the nature of each catalyst.

Certain ideas are presented regarding the mechanism of aromatization of *n*-alkane molecules containing six—or more—carbon atoms.

Kinetics of Dehydrogenation of Cyclohexane Over Films of Palladium Metal

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The relationship between charge pressures of cyclohexane and its initial rate of dehydrogenation over films of palladium metal was studied at fixed temperatures of 27.8°, 34.3°, and 41.3° and fixed pressures of 4×10^{-4} to 2×10^{-2} mm Hg. For each operating temperature, the relationship can be expressed by a stepwise curve of S-shaped appearance near the origin of the coordinates. This finding can be interpreted to mean