

BOOK REVIEW

Aspects of Homogeneous Catalysis, Vol. 3. EDITED BY RENATO UGO. D. Reidel, Dordrecht, Holland/Boston, Mass., 1977. 240 pp.

The most recent volume in this review series consists of three major articles and maintains the high quality of its predecessors. The largest review is by James E. Lyons on "Transition Metal Complexes as Catalysts for the Addition of Oxygen to Reactive Organic Substrates." This article is an introduction to oxidation reactions involving coordination of either substrate or oxygen as part of the catalytic cycle. Thus metal-catalyzed reactions such as phosphines to phosphine oxides, isocyanides to isocyanates, and the oxidation of various organic nitrogen-containing species are covered in the first half of the review. While the review gives an accurate picture of the theories of reaction pathways prevailing about two years ago, the rather lengthy time that these articles have spent in press means that the impact of the more recent work of Halpern, in which the oxidation of phosphines to phosphine oxides with PtL_3 has been shown to involve intermediate formation of the hydroperoxide ion, could not be considered. The second half of the review includes an extensive and lucid description of the important area of the reactions of hydroperoxides with metals in the presence and absence of olefins. A good balance is struck throughout the article with respect to descriptive material, kinetic results, and mechanistic interpretations. The author has chosen not to cover hydrocarbon autoxidation reactions mediated by metals, and while this is a logical breakdown of the field, anyone wishing to get into this area in any practical sense would do well to read the review by Sheldon and Kochi in *Advances in Catalysis*, Vol. 25, in order to have a parallel introduction to the free radical chemistry which can exist whenever metal complexes, organics, and oxygen are brought together.

The second review in the book is by J. M. Basset

and R. Ugo and is entitled, "Structure and Electronic Relations Between Molecular Clusters and Small Particles." This article concentrates on the similarities in physical properties between metal cluster complexes (particularly metal carbonyls) and very small metal particles (VSP). Analogies are drawn between the two classes of material in areas such as the geometries exhibited in VSP and those manifested in cluster complexes, the transmission of electronic effects, metal-metal bond distances, and metal-metal bond energies. This approach exposes some interesting comparisons from two areas of science which used to be considered separate disciplines but which seem to be drawing closer together. There is a dearth of comparisons as far as actual catalytic chemistry is concerned which hurts the arguments somewhat.

The final review in the book is entitled "Asymmetric Hydrosilylation by Means of Homogeneous Catalysts with Chiral Ligands," and is authored by I. Ojima, K. Yamamoto, and M. Kumada. The principal areas covered are the catalytic hydrosilylation of olefins and ketones, the asymmetric reduction of carbon-nitrogen double bonds via hydrosilylation, and asymmetric synthesis of bifunctional organo-silicon compounds via hydrosilylation. This article is an excellent introduction to the synthetic capabilities of hydrosilylation reactions. There is considerable detail in the article on catalyst compositions, reaction yields, and optical purity of the products. There is little description of reaction conditions in the article which is unfortunate in an area which is very dependent on conditions such as temperature and solvent composition. Nevertheless, this article should prove to be a valuable reference work for people working in asymmetric synthesis.

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