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BOOK REVIEWS

Transition Metals in Homogeneous Catalysis. Edited by G. N. SCHRAUZER, Dekker, New York, 1971. ix + 415 pp. $32.50.

This is an extremely interesting book. It is well written and well edited, and contains a great wealth of useful information. Although the editor and the authors disclaim any attempt to cover the literature completely, they have certainly covered the significant points of the topics which they have discussed.

After a short introduction on the fundamentals of catalysis (by the editor), there follow five chapters which deal particularly with the reactions of organic compounds—hydrogenation and dehydrogenation, π-alkyl systems, oxidation of organic compounds, carbonylation, and catalysis of symmetry forbidden reactions. The first four of these are quite uniform in plan. Each opens with a discussion of the fundamental chemistry involved, critically examines the mechanisms which have been proposed, and describes a large number of examples of the type of reaction in question. This last feature is important, for variations in the catalyst and in reaction conditions frequently alter the nature of the products. For example, the reaction of carbon monoxide with a specific olefin may give entirely different products, depending upon the composition of the metal carbonyl which serves as the catalyst. In these chapters, which deal largely with synthetic organic chemistry, the authors frequently point out the pitfalls that may be expected, and the oddities of reactions that show anomalies.

The chapter on the catalysis of symmetry forbidden reactions is somewhat different in plan than the preceding ones in that a large fraction of it is devoted to the theory of such reactions. This discussion is based largely upon molecular orbital theory. There is correspondingly less instruction in procedures for carrying out specific reactions, though such instruction is not lacking, by any means.

The last chapter in the book is concerned with electron-transfer catalysis, and is largely devoted to the mechanism of electron-transfer reactions in inorganic complexes. Like the other chapters, this one is critical rather than comprehensive.

The whole subject of homogeneous catalysis by metal ions is relatively new, but it has achieved great importance. The Wacker and Oxo processes are widely used in industry, and other synthetic processes homogeneously catalyzed by transition metals show promise of finding industrial use, also. An enormous literature on the subject has accumulated. This book lists 1250 references, mostly from journals, but some from the patent files.

"Transition Metals in Homogeneous Catalysis" will be a valuable reference book for all who are interested in this growing area of chemistry. It is unfortunate that the price is so high, for this will confine it largely to university and company libraries.

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Transition Metal Hydrides. Edited by EARL L. MUETTERTIES, Marcel Dekker, New York, 1971. xv + 342 pp. $14.50.

This book is a collection of separate chapters written by E. L. Muetterties, B. A. Frenz and J. A. Ibers, J. P. Jesson, R. A. Schunn, and C. A. Tolman. There is an introductory chapter on the physical properties of hydrogen and its isotopes, followed by a section devoted primarily to hydride phases in the solid state. The major portion of the book then goes on to deal with the molecular structure of hydride complexes and is followed by sections on the systematics, stereochemistry, and the role of transition metal hydride complexes in homogeneous catalysis. The book covers much of the current research in the area and includes a section dealing with the mechanisms of stereochemical nonrigidity in hydride complexes. This inclusion is particularly important since, although only a few results are available yet in this area, it gives an insight into a field which will develop rapidly in the next few years. The book deals with the subject of transition metal hydrides in a

comprehensive manner and is primarily intended for the research worker; however, it is not inconceivable that it could be used as the text for a special topics course. Despite this limitation that the book is aimed at the research worker it is to be hoped that its appeal will not be too narrow. The rapid increase in importance of transition metal hydrides in chemistry during the last few years means that the book should not be only of use to inorganic chemists, but should be valuable to people working in catalysis as well as anyone involved in organic synthesis where the involvement of organometallic compounds is rapidly increasing. The usefulness of the book is further increased by its extensive bibliography, and although this has caused it to be more of a reference work with a subsequent decrease in readability, the discussion portions in each chapter prevent the work from becoming too encyclopedic in nature.

In many cases where a book is a collection of chapters written by different authors there is a lack of cohesiveness, and it is apt to become a series of disconnected essays which are only related by the title of the work. This fault has been avoided in this book, however, since all but one of the chapters have been written by a person working at the Central Research Department of DuPont, and the frequent cross-referencing and theme among the various chapters shows that there has been careful collusion between the various authors.

The book makes good use of tables to present a considerable amount of data, the diagrams are clear, and there appears to be very few errors in the work. The book could be criticized, however, in that the section on solid phase hydrides is rather brief and separated from the remainder of the text, and there is no attempt to correlate this material pertaining to heterogeneous catalysis with the chemistry of transition metal hydride complexes. This addition would, however, represent an enormous task and its omission does not detract from the value of the book.

My overall impression is very favorable, and I feel that this comprehensive book on transition metal hydrides at a reasonable price will fill a need which is not being covered by any other text currently available.

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