

Book reviews

Inorganic Reactions and Methods, Volume 1, The Formation of Bonds to Hydrogen (Part 1), ed. by J.J. Zuckerman, xxv + 326 pages, VCH Publishers Inc., ISBN 0-89753-251-3, Deerfield Beach, Florida, 1986, DM 275.

This book is the first volume of 17 devoted to a description of “all of inorganic reaction chemistry”. It uses the periodic system as a basis for organization, and consequently the series begins with the formation of bonds to hydrogen. There is an introductory section describing how to use the book, and this is clearly valuable. It is difficult to assess the whole series on the basis of one volume, which covers the formation of H–H, H–halogen, and H–chalcogen (including Te and Po) bonds. One immediately has reservations. The plan must surely place a considerable emphasis on covalent binding? How is multi-centred bonding to be dealt with?

Undoubtedly the complete work will provide a reference source of value. There are sets of references which will enable one to obtain recipes for particular compounds, so that for preparative purposes it could provide a valuable resource. However, the fact that the four final volumes will depart from the pattern of the other 13 in order to cover material (such as catalysis and ceramics) which does not fit easily into the general scheme suggests that the editors also have some reservations about the organization. The final verdict must await the publication of further volumes. In the meantime, the first volume holds some promise for the rest.

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Advances in Polymer Science, 81, Catalytic and Radical Polymerization, Springer-Verlag, Heidelberg and Berlin, 1986, ISBN-0-387-16754-4, DM 148.

This volume contains four reviews, processed by different editors, covering selected aspects of the title subject. The principal organometallic content is in the first two reviews, edited by G. Henrici-Olivé and S. Olivé, although neither is organometallic in its fundamental approach. The first review, by P.C. Barbé, G. Cecchin, and L. Noristi, treats the catalytic system Ti-complex/MgCl₂. It deals with the characteristics of MgCl₂, the effect of TiCl₄ upon the properties of MgCl₂, the influence of Lewis bases, and the co-catalyst, usually an aluminium alkyl. The result of changing conditions and components on polymerization activity is discussed in some detail, leaning heavily upon patent literature and other sources not always consulted by organometallic chemists. The review finishes with a survey of industrial applications. This is a useful review, valuable for background, without being of mainstream interest to organometallic chemists.

The second review, on the determination of the number of active centres in Ziegler-Natta polymerizations, by J. Mejzlik, M. Lesná, and J. Kratochvila, surveys the methods used in critical fashion, covering a wide range of systems. It concludes that there is no method for the direct and selective determination of active centres which is completely free of objections. The discussion of conventional organometallic mechanisms is minimal.

A third review, on the synthesis and properties of substituted polyacetylenes, by T. Masuda and T. Higashimura (editor S. Okamura) presents a summary of the various catalyst types employed and the mechanistic routes (thought to concern metal carbenes) involved. This is a useful, though from an organometallic viewpoint over-brief, review.

In summary, this book will provide background material for those interested in organometallic catalysis of polymerizations. It will not be a primary reference for many organometallic chemists. Polymer chemists may find it much more generally useful.

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Catalysis: Science and Technology, Volume 8, Edited by J.R. Anderson and M. Boudart, Springer Verlag, 1987, 262 pages, DM 148, ISBN 3-540-15034-X.

This series of books on catalysis in science and technology is now almost complete. Its purpose has been to collect authoritative reviews on the main areas of catalysis, rather than to provide a long-running series of "Advances" type articles. The emphasis throughout has been on processes which have industrial relevance, and in all the articles many relevant practical details are provided.

The first chapter, by G. Chinchin, P. Davies and R.J. Sampson, all of ICI, details the historical development of catalytic oxidation processes. The reactions discussed include oxidations of sulphur dioxide and ammonia, and various routes to the production of maleic anhydride. The review is almost entirely concerned with heterogeneous systems. Chapter 2, by J.C. Mol and J.A. Moulyn considers alkene metathesis, starting with a useful, if fairly conventional, discussion of the reaction mechanism. Both homogeneous and heterogeneous catalysts are well discussed, together with problems relating to the stereochemistry of the reaction and the routes for initiation. The major industrial applications of the processes are also reviewed.

Chapter 3, by J.J. Carberry, reviews physico-chemical aspects of mass and heat transfer in heterogeneous catalysis, with Chapter 4, by K.C. Pratt, dealing with small scale laboratory reactors. The final section, by J.H. Lunsford, deals with the application of EPR methods in studies of heterogeneous catalysis. Not only is this technique valuable because of its great sensitivity, but it also provides much information not readily available by other methods.

As we have come to expect from this publisher, the volume is well-produced with clear illustrations and few errors. Most of the chapters are well referenced into 1985. Perhaps the weakest point of the production is the index, which is rather limited.