

organometallic complexes, organised with respect to the number of carbon atoms which are associated with the metal. The stoichiometric reactions of such complexes are next considered with particular reference to substitution, addition and ligand replacement. A recurrent theme of this section is the difference in reactivity between the free and bound ligands. Under the heading of reactions catalysed by π -complexes there are excellent accounts of hydrogenation including enantioselective reactions, the Fischer-Tropsch Synthesis and a range of hydrometallations and dimetallations.

Section two of this volume continues the discussion of catalytic reactions with critical accounts of hydroboration, carbometallation and a range of other additions to carbon-carbon multiple bonds. Oxidation, reductive substitution, isomerisations and rearrangements and alkene and alkyne metathesis are also considered in detail.

The organisation of this volume is a tribute to Dr. Jurgen Falbe and his collaborators. The contents tables are very detailed, obviating the need for a subject index. There is a complete author index as well as a useful index of compounds. The book is well illustrated, with many valuable tables, increasing its accessibility to the user who does not read German well. It is, however, surely an appropriate time to consider producing these volumes in English. Both Gmelin and Beilstein are now published in English and at least 450 pages of this current volume (by Professor P. Pauson) must originally have been written in English. There is an excellent bibliography of review articles and monographs for each section, running well into 1985. A glance through the first four pages or so of these revealed six published in German, five in Russian with subsequent English translation and one hundred and nine in English. Many useful references, again running into 1985, are also given in each section.

Like the other volumes in this series this work is attractively presented and meticulously accurate. The price of the series is now so high as to deter all but the most affluent libraries from purchasing it, but this volume should be accessible and will be invaluable to any organic or organometallic chemist.

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Metal Clusters; edited by Martin Moskovits, Wiley-Interscience, New York and Toronto, 1986, ix + 313 pages, £47.95, ISBN 0-471-89388-9.

Cluster science has made considerable progress over the past decade, as the editor of this interesting book, Martin Moskovits, and many of his chapter authors remind us. The subject has attracted the attention of chemists and physicists, experimentalists and theoreticians, synthetic chemists and spectroscopists, rather aptly providing the focal point around which scientists from a wide range of disciplines nucleate. We are now beginning to understand how to make and examine molecular clusters and to unravel the intricacies of their structures, to appreciate their relevance to what happens at surfaces, and to get some feeling for the subtle differences between naked metal clusters containing but a few atoms, studied in

inert matrices at low temperatures or in gas-phase beams, and the small metal particles that achieve such wonders as supported metal catalysts.

This book, a collection of review chapters by specialists in various aspects of metal cluster chemistry, will help our understanding by providing insight into such issues, and by functioning as a useful source of information on many of them, not only for the newcomer to the area (who may find rather too much background knowledge is assumed) but also for the specialist in one aspect who needs to be briefed on developments elsewhere. It begins with a frustratingly short introductory overview by the editor, followed by two chapters in which a discussion of the computational methods available to treat cluster bonding in detail (R.C. Baetzold) rather surprisingly precedes a discussion of cluster shapes (D.H. Farrar and R.J. Goudsmit) where we learn that simple bonding treatments have considerable value. (One might have expected the detailed treatment to follow the qualitative discussion.) This latter chapter and the two that follow it, by A.J. Poč on metal carbonyl cluster reaction kinetics and by J.S. Bradley on organometallic cluster chemistry (including homogeneous catalytic aspects) will be of particular interest to readers of this journal, who will find them clear, helpful and authoritative. Later chapters deal with the characterisation of gas-phase (J.L. Gole) and matrix-isolated (M. Moskovits) metal clusters (a useful complementary pair), and with supported heterogeneous catalytic systems that again provide particular interest for the organometallic chemist. P. Gallezot discusses the use of zeolites as supports for metal clusters small enough to be accommodated in their cavities, while A. Brenner and B.C. Gates, in separate chapters with apparently common objectives, provide different perspectives on other types of supported metal cluster catalysts.

Altogether, these surveys add up to a useful contribution to the development of cluster chemistry, particularly that of the later transition metals. Its value to cluster chemists in general will be limited by the topics it does not cover. Though the omission of boron clusters as explained by the editor is readily intelligible – boron is not a metal anyway – the failure to discuss the cluster chemistry of such main group metals as germanium, tin, lead, antimony and bismuth is surprising. Even more so is the absence of discussion of the metal halide clusters formed by early transition metals, an important class of compound that provides materials with useful exploitable bulk properties when the cluster units are stacked in extended columns or arrays. Another disappointing omission is that of the metal sulphide clusters that feature so prominently in biological systems and which have attracted so much attention recently. These omissions apart, this volume will prove helpful to cluster and organometallic chemists.

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Infrared and Raman Spectra of Inorganic and Coordination Compounds, by K. Nakamoto, 4th edition. Wiley-Interscience, New York, Chichester, Brisbane, Toronto, Singapore, 1986. xi + 484 pages, £52.75. ISBN 0-471-01066-9.

For over twenty years Nakamoto was undoubtedly the standard against which all