

Book reviews

Hypercarbon Chemistry, by G.A. Olah, G.K.S. Prakash, R.E. Williams, L.D. Field, and K. Wade, Wiley, New York, Chichester etc., 1987. xvi + 311 pages £47.95. ISBN 0-471-06473-4.

This book deals with the chemistry of compounds in which carbon is bonded to five or more other atoms, and is successful in demonstrating the unity of the concept of hypervalent carbon in fields seemingly as diverse as metal alkyls, carboranes, metal-carbon clusters, acid-catalysed hydrocarbon chemistry, and carbocations. The relationships between apparently disparate species are clearly revealed; the point is made, for example, that almost all carbocations have known isoelectronic and isostructural neutral boron analogues, and that boron compounds can provide useful models for many types of transition states or intermediates in reactions of organic compounds with electrophiles. The scope and nature of the book are made clear by the chapter headings: Introduction and general aspects (40 pages); Bridged (associated) metal alkyls (36 pages); Carboranes and metallacarboranes (32 pages); Mixed metal-carbon clusters and metal carbides (27 pages); Hypercoordinate carbocations (51 pages); Carbocation, borane, and polyborane analogs (22 pages); and Hypercarbon reaction intermediates (73 pages).

This is an authoritative and clearly presented account, which is not just an outline of present knowledge but also a creative contribution that will influence the thinking of many research workers over a wide range of chemistry. It should be read by all organic, inorganic, and organometallic chemists who wish to keep reasonably up to date, and the straightforward nature of the accounts makes it very suitable for advanced undergraduates and new postgraduates, as well as, at the other end of the scale, for experienced specialists in any of the various fields it covers. It is a pity though that the authors of a book which aims to demonstrate the wide applicability of the concept of hypervalent carbon should themselves apparently be unaware of the demonstration (initially as long ago as 1979) of 1,3 alkyl-bridging in cations between silicon atoms (and more recently between silicon and germanium or tin atoms), which has given rise to a well developed chemistry.

There are a few minor irritating aspects of presentation. Each chapter finishes with a little section headed "Conclusions", which does not offer conclusions at all, but rather 'concluding remarks' or a summary of the main points covered in the chapter. The Index (presumably computer-produced) is absurd, but can be read for amusement. What, for example, in a book of this nature is one to make of entries such as: bimolecular pathway; carbon-carbon bonding, negligible; carbon-carbon bonding, weakening the; cationic metal residues, suitable; chlorine atom; Cossee and Arlman, mechanism that is of; Cossee-Arlman mechanism, favors; cobweb-like; deviation from linearity; equilateral triangular faces; hexameric; isosceles triangular faces, six smaller; kinetic products, accidental; metal identity; narrow line widths;

nodal characteristics, no wrong; nonbonding role; Olah's original method; peak area intensity; β -scission, undergo; stereoregularity dictates; three pairs of π -bonding electrons; very shallow activation energy barrier? Fortunately the content of each chapter is very clearly defined in the Contents pages.

There is an interesting Foreword (wrongly described as a Foreward) by W.N. Lipscomb.

This valuable addition to the literature is strongly recommended. It will be much consulted and often cited.

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Dictionary of Organometallic Compounds, Second Supplement. J.E. Macintyre (Ed.), Chapman and Hall, London, 1986, xiii + 626 pages, £135.00. ISBN 0-412-26330-0.

This second supplement to the very well received Dictionary of Organometallic compounds consists of new entries or additional material for previous entries largely derived from primary publications appearing in the year up to mid-1985. However there is also a substantial number of new entries for previously known compounds that were omitted from the initial volume but are included now as a result of second thoughts by the compilers or at the suggestion of readers. A very useful list of selected books and reviews dealing either with organometallic compounds in general or with specific elements is included.

For each element the compounds appear in an order determined by their formula (primarily on the numbers of carbon and hydrogen atoms). There is a Name Index (covering the main volume and the first as well as the present supplement) which occupies 73 packed pages, but this will, I suspect, be of limited use to readers because they will often not be aware of, or will be reluctant to take the trouble to work out, the systematic names of the compounds they are interested in. Much more use is the cumulative Molecular Formula index, which takes up 90 pages: for each entry the compound is named, and some authors who have not taken the trouble to determine the systematic names of their new compounds in their publications will find the task done for them here. There is also a 62 page Chemical Abstracts Service Registry Number Index.

The volumes are primarily intended for those who wish to look up individual compounds, but to my mind their outstanding feature is that the clarity of the presentation makes it easy to run through every entry for an element in order to see what types of compound are available, and also when a specific compound one is interested in is not listed, to see whether any closely related compounds are shown.

This supplement will be greeted with enthusiasm by those organometallic and organic chemists who have consulted the earlier volumes. Those who do not have ready access to this Dictionary should make every effort to have it made available to them.

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