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Book Reviews

Advances in Carbanion Chemistry.Vol. 2. V. Snieckus, ed., JAI Press, Greenwich, CT. USA, and London, *1996, viii + 272 pages. $ 109.50, £69.50. ISBN 1-55938-548-0.*

In the nature of things, accounts of carbanion chemistry necessarily contain material of direct interest to organometallic chemists and this is especially the case for all five reviews in this volume.

The first review, easily the longest (85 pages; superficially there are 108 references, but many of these are multiple, and I estimate that the actual number is at least four times as large), written by E. Vedejs and M.J. Peterson, is entitled *The Wittig reaction: Stereoselectivity and a History of Mechanistic Ideas (1953–1995)*. It is an impressive *tour de force* that presents a detailed chronological account of the development of mechanistic understanding of this important reaction over the 42 years following its discovery. It packs in an impressively large body of information, and although well organised is not easy to read, but for the many chemists interested in the reaction the effort will be very rewarding. The authors bring out clearly the fact that although much high quality mechanistic work has been carried out there is still more to be done.

The second essay (24 pages, 33 references), by A. Yanagisawa and H. Yamamoto, is about *Formation and Reactions of Stereochemically Homogeneous Allylic Metals*. It is concerned with methods for stereoselective generation of allyl derivatives of alkali and alkaline earth metals and their highly regio- and stereo-selective reactions introduced by the authors of the review. (I wonder about the validity of their use of the term *allylic metals*. Allylic is necessarily an adjective, and I do not see how a metal can be allylic, though derivatives of metals can be; the simpler term *allylmetals*, often used as an alternative in the review, seems preferable. It could be argued, however, that allylic metals are no less likely than organometallic chemists!)

The remaining reviews are as follows: *Stereoselective Reactions Based on Zinc and Boron Enolates* (36 pages, 122 references) by E. Tagliavini, C. Trombini and A. Umani-Ronchi, a clear and well-informed survey; *Advances in Photochemical Generation and Reactions of Carbanions* (42 pages), by D. Budac and P. Wan, which contained much material new to me and which I particularly enjoyed reading; and *Benzyl and Heteroarylmethyl Carbanions: Structure and Substituent Effects* (75 pages 228 references) by S. Bradamante and G.A. Pagani. My view of this last survey is coloured, perhaps unfairly so, by my finding no mention of the detailed studies in 1976–1985, by Dr. G. Seconi, myself, and our coworkers, of the generation of benzyl and related carbanions R^- in cleavage of $RSiMe_3$ compounds by, for example, NaOMe in MeOH, of the information thus gained about the relative acidities of the corresponding RH compounds, or of the interesting isotope effects revealed by the ratios of the products RH and RD in MeOH–MeOD mixtures. Perhaps the authors considered the studies unworthy of detailed description but they should surely have mentioned them. If the reason for the admission is that they were unaware of the work then one must wonder whether other aspects of their subject have been overlooked.

This attractively-priced addition to a promising series deserves a place in the libraries of all organisations concerned with organic or organometallic chemistry.

Advances in Silicon Chemistry. Vol. 3, G. L. Larson, Ed., JAI Press, Greenwich, Conn. USA, and London, *1996, ix + 279 pages, US$109.50; £69.50. ISBN 1-55938-831-5.*

This addition to a very good series of volumes contains three reviews of high quality in areas of organosilicon chemistry of much current interest.

The first review (62 pp, 265 refs), by K. Tamao, deals with *Oxidative Cleavage of the Silicon–Carbon Bond: Development, Mechanism, Scope, and Limitations*. It is a clearly authoritative account by someone who has contributed importantly to the field, and will be of great value to those concerned with use of organosilicon compounds in organic synthesis. It is admirably organized, with effective use of clear diagrams and tables, and consequently can, with profit, be quickly scanned to provide a good impression of the scope and range of the methods or be used for ready access to details of specific procedures. To have achieved perfection in my eyes, the account needed only an inclusion of

a small section devoted to the formation of phenols, which is touched on only incidentally and briefly even though some of the pioneering work on that topic was carried out by Prof. Tamao.

The second review (62 pp, 71 refs), by A. Ricci, G. Seconi, R. Curci and G. L. Larson, deals with *Organosilyl Peroxides*, and provides a first class guide to another branch of organosilicon chemistry of considerable importance in organic synthesis. Again the quality of the account reflects the fact that several of the more useful applications were developed (in the excellent Institute of Compounds of Carbon containing Heteroatoms and their Applications, located in Bologna and headed by Dr. Seconi) by some of the authors of the review. The methods of preparation of the various peroxides used, *viz*. silylhydro-, silylalkyl- and silylaryl-peroxides, silylperoxy esters, bis(silyl)peroxides, and bis(trimethylsilyl) Caro's acid ($Me_3SiOSO_2OOSiMe_3$), are first outlined and then their use in oxidation of various types of organic compounds. Noteworthy attention is given to mechanisms. The scope of the methods is made immediately evident by effective use of equations and tables. The review will promote even more widespread use of organosilyl peroxides, for my impression is that the potential of some of the applications has been far from fully appreciated; for example, the production of phenols both by reaction of aryllithium compounds with $Me_3SiOOSiMe_3$, introduced by Taddei and Ricci, and the use of that peroxide in the presence of triflic acid for direct electrophilic of aromatics developed by Olah and his colleagues.

Finally, in the third review (165 pp, 496 refs), *The Chemistry of α-Silyl Carbonyl Compounds*, G.L. Larson, the editor of the series of volumes, provides the first comprhensive account of the rich chemistry of compounds having a silyl group directly attached to a carbonyl centre. The syntheses of α-silyl–aldehydes, –ketones, –carboxylic acids, –esters, –amides and –ketenes are covered in detail in separate sections, and further sections then deal with the reactions of these species. A large body of information is clearly presented, and even a fairly superficial study of the account by organic chemists is likely to suggest future applications of the reactions in synthesis.

This is to, my mind, an outstanding book that deserves good sales and a wide readership. At today's prices, it represents excellent value, and I recommend it unreservedly.

Organotin Chemistry by A.G. Davies, VCH, Weinheim etc., *1997, ix + 327 pages. £90.00. ISBN 3-527-29049-4.*

This excellent book by a leading contributor to the development of organotin chemistry is greatly to be welcomed. It is especially valuable in being by a single, well-informed, author, which makes it so much more satisfactory than the multi-author volumes in which one so often finds that the particular topic which one especially wants to learn about does not fall into any of the unrelated surveys, which in any case are frequently of variable quality.

Although much factual information is presented very efficiently the account must necessarily, in a book of this size, be far from comprehensive, but (except for applications of organotin compounds in organic and organometallic synthesis, which were specifically excluded) all the main aspects of organotin chemistry are at least touched upon, with appropriate reference to further reading. A brief general introduction is followed by a compact (15 page) outline of physical methods, followed by a chapter on the formation of tin–carbon bonds, and then accounts of the methods of preparation and the reactions of the main types of organotin compound, ending with organotin radicals and, finally, stannylenes, stannenes and distannenes. There is much more material than might be expected since almost twice as many words are accommodated in each page than in many comparable texts, and yet the quality of the print and of the equations and diagrams make it easy to read.

I was disappointed not to find more on reaction mechanisms but I accept that the great majority of readers will be looking for a factual guide to methods of synthesis and reactions. If the account could have been say 5% (i.e. *ca*. 16 pages) longer I should have liked to see the four-page section on cleavage carbon–tin bonds expanded to say 10 pages to provide for an outline of the mechanisms of cleavage of the various types of such bonds. This would have brought out, for example, that aryl–tin bonds are quite readily cleaved by nucleophilic reagents such as sodium methoxide in MeOH as well as very readily by electrophilic reagents, and that alkynyl–tin bonds are extremely readily cleaved by nucleophiles such as hydroxide, methoxide or fluoride ions in suitable media (though cleavage by butyllithium is mentioned incidentally), and would have given a more appropriate reference to the detailed knowledge available on base cleavage of benzyl–tin and related bonds. I should also have welcomed, say, another five pages on Mössbauer and NMR spectra, with data for a much wider range of examples, and inclusion of references to the sources of data that are given in the tables. The remaining five additional pages could then appropriately be devoted to compounds with tin-transition metal bonds, which at present is dealt with somewhat inadequately in two pages. However, any deficiencies in these respects are insignificant against the background of the overall high quality of the account.

An important and interesting and feature of the book is that it comes with an attached disk providing the data base in the form of a tagged text file containing the more than 2,500 references on which the text is based;

this can be opened on any word processor and searched in the usual way. More flexible versions can be downloaded free of charge from the WorldWide Web sites http://www.niles.com (USA) or http://www.cherwell.com (UK). The data base will be kept up to date and revisions made available periodically.

This book should be the first choice for anyone wishing to become informed about organotin chemistry in general or seeking sources of more detailed information. It should be available not only to organotin chemists but also, in view of the considerable and ever-increasing importance of organotin reagents in organic and organometallic synthesis, to a very much wider readership.

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Advances in Boron Chemistry. Ed. by Walter Siebert (University of Heidelberg, Germany). The Royal Society of Chemistry: Cambridge UK, *1997, xiv + 530 pp. £79.50. ISBN 0-85404-722-0*

This book summarizes new results and advances discussed at the Ninth International Meeting on Boron Chemistry held in Heidelberg, Germany, July 14–18, 1996. It contains 74 research articles contributed by leading scientists which are organized into the following 11 sections: Theoretical/Computational Chemistry (4 articles), Organoboranes (11 articles), Organoboranes in Organic Synthesis (6 articles), Chiral Organoboranes (4 articles), Boron Heterocycles and their Complexes (8 articles), Carboranes (9 articles), Metallacarboranes (6 articles), Transition Metal Boryl Complexes (5 articles), Polyhedral Boranes and Heteroboranes (10 articles), Metallaboranes (6 articles), and finally Boron Containing Polymers and Materials (5 articles). All of the articles provide key literature references. A short subject index (5 pages) is also provided.

The articles in this book are generally very interesting and recommended to anyone interested in the current status of almost all aspects of the chemistry of compounds with boron–carbon and boron–hydrogen bonds. However, other important areas of boron chemistry, notably the chemistry of borates and solid state borides, are absent from this book reflecting the interests of the participants at the international meeting on boron chemistry. The three sections involving organoboranes containing a total of 21 articles are likely to be of greatest interest to readers of the Journal of Organometallic Chemistry.

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Pictures of Molecules
A pictorial approach to Molecular Bonding and Vibrations—2nd ed J G Verkade, approx 380 pp, 295 figs, 85 tabs. *Hardcover £42.50 (DM 98.-)*

Molecular orbital theory is an important concept in many areas of chemistry and taught to undergraduate students, often in their first year. At that stage, the underlying abstract mathematical framework of quantum mechanics and group theory can be a daunting prospect to learn.

In his book, Prof John Verkade introduces the subject of molecular orbitals (MO's) in a fresh and innovative manner that will appeal to the reader. Right from the start plenty of pictures (about as many as there are pages!) help to visualize the concepts of the text.

After the first two introductory chapters on the nature of bound electrons and atomic orbitals the book becomes very practical and proceeds from diatomics (first homo-, then hetero-nuclear) over triatomic molecules (first linear, then trigonal to bent) through to polygonal molecules, every time giving plenty of examples, including references to relevant chemistry. MO energy diagrams are used frequently to illustrate how the electronic structure evolves when moving to more complex geometries, however, there is only a small portion of the discussion devoted to molecular motion (vibrations).

The author then takes us into 'proper' 3-dimensional chemistry of octahedral, tetrahedral, bipyramidal and prismatic molecules. Traditional metal complexes are considered as well as some metal clusters, organometallic compounds, exotic hydrocarbons and boron hydrides. All these structures are covered without the need to talk explicitly about symmetry groups.

The book rounds off with three glimpses into how the MO approach can be applied to current trends in material science, areas that would need further treatment in more comprehensive textbooks: chapter 12 familiarizes the reader with polymers and we find reference to electrically conducting polymers, which are explained using delocalized MO's. The next chapter on cages introduces the fullerenes and energy levels of them obtained by Hückel calculations. The theme of fullerenes may have fitted in more naturally before the

chapter of polymers, which in turn would possibly be better discussed closer with the contents of the last chapter, solid state materials. An extensive appendix (44 pp) also offers the interested reader additional background information on mathematical methods, again using many figures. After the index about ten blank pages are available for one's own sketches.

Overall, I found this book innovative and very well illustrated. The main focus is the electronic structure and vibrations seem to play a less important role than the title implies. I would have liked an explanation of all those acronyms (GO, SM, SO, ...) listed on the inside of the cover for quick reference. Each chapter has a summary and plenty of exercises for the reader, which make use of the author's own software 'Nodegame', which is available for several types of computers on the Internet. The price may make it prohibitively expensive for students to buy, however, I could imagine a course with a 'hands-on' computing workshop using the 'Nodegame' to be an asset to students.

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