

## Book Reviews

**Advances in Metal-Organic Chemistry.** Volume 3. Edited by L. S. Liebeskind. JAI: Greenwich, 1994, 321 pp., hardback. £ 58. ISBN 1-55938-406-9.

This book contains five chapters: *Orthomanganated Aryl Ketones and Related Compounds in Organic Synthesis* by L. Main and B. K. Nicholson (50 pages), *Cyclopropylcarbene-Chromium Complexes: Versatile Reagents for the Synthesis of Five-Membered Rings* by J. W. Herndon et al. (45 pages), *Palladium-Catalyzed Vinylic Substitution* by R. C. Larock (128 pages), *Ruthenium-Catalyzed Oxidative Transformations of Alcohols* by S.-I. Murahashi and T. Naota (31 pages), and *Palladium-Catalyzed Carbonyl Allylation via  $\pi$ -Allylpalladium Complexes* by Y. Masuyama (49 pages). Also included is a useful general index (17 pages).

As can be seen from the chapter titles given above, this volume includes a wide range of topics. The contribution by Main and Nicholson begins by providing the reader with a helpful summary of preparative methods leading to orthomanganated aromatic ketones and structurally related substances. A short section on the physical and spectroscopic properties of the manganese complexes is followed by a well-organized presentation of the impressively diverse uses of these materials in organic synthesis. Detailed experimental procedures of representative reactions are given.

The uses of carbene-chromium complexes in organic synthesis are now well established. In the chapter by Herndon *et al.*, the authors provide an excellent summary of chemistry involving the intermediacy of cyclopropylcarbene-chromium complexes. It turns out that reactions of the latter materials with alkynes and alkenes constitute useful methods for the preparation of functionalized cyclopentenones and cyclopropylcyclopropanes, respectively. On the other hand, thermolyses of 2-alkenylcyclopropylcarbene complexes also provide substituted cyclopentenone products. The scope and limitations of each of these methods, as well as mechanistic proposals, are discussed. Again, detailed experimental procedures are included.

The material covered in the Larock chapter is likely to be of widest general interest to synthetic organic chemists. This is in no small measure due

to fact that, over the past two or three decades, the discovery and development of new palladium-catalyzed processes have had an enormously beneficial effect on the practice of organic synthesis. Larock has done an excellent job of summarizing a large number of palladium-mediated reactions that have proven (are proving) to be of notable value for the construction of organic compounds. In this chapter, Larock covers palladium-catalyzed vinylic substitution reactions that involve the use of a wide range of vinylic substrates, including halides, iodonium salts triflates, sulfonates, phosphates, and an impressive number of vinylic organometallics. The presentation is replete with equations (510 in total!) that nicely demonstrate the effectiveness and diversity of the methods that Larock so capably summarizes in a well-organized fashion. Also included are 809 references. In the opinion of this reviewer, this chapter alone makes the purchase of the book worthwhile.

The relatively short chapter by Murahashi and Naota reviews useful chemistry involving ruthenium-mediated oxidative transformations of alcohols. The synthetically most valuable reactions discussed include the oxidative conversion of diols and amino alcohols into lactones and lactams, respectively, the oxidative condensation of aldehydes in the presence of alcohols to produce esters, and the ruthenium-catalyzed oxidation of secondary alcohols, primary alcohols, and cyanohydrins to ketones, aldehydes, and acyl cyanides, respectively. Although the subject matter covered in this chapter is somewhat narrowly defined, the authors have done a good job of presenting the scope and limitations of a number of ruthenium-based oxidations that are of substantial use in organic chemistry.

The final article in the book summarizes chemistry that is based on the *in situ* conversion of  $\pi$ -allylpalladium complexes, which serve as synthetic equivalents of allyl cations, into allylmetaloid species that function as allyl anion synthons. For example, treatment of allyl alcohol, allyl acetate, or allyl methyl carbonate with tin(II) chloride in the presence of a suitable palladium catalyst produces a reagent that efficiently allylates aldehydes to give 1-alken-3-ols. The scope and limitations of this type of reaction, as well as the results of investigations into the chemo-, regio-, and diastereoselectivities of the allylation proc-

esses, are presented and discussed.

In summary, this is a reference book that will be of value to scientists whose interests lie in the broad area of synthetic organic chemistry and, more specifically, in the use of organometallic-based reagents and methods for organic synthesis. This volume should also be of considerable use to those who teach senior undergraduate or graduate courses in modern synthetic chemistry.

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**Tactics of Organic Synthesis.** By Tse-Lok Ho. Wiley: Chichester, 1994, 450 pp., hard-back. £ 49.50. ISBN 0-47159-896-8.

In this book the author focuses our attention on some of the more elegant highlights of chemical syntheses that have been carried out over several decades. He attempts to do this in an instructive way, pointing out the "tactics" adopted by the synthetic chemists to overcome significant challenges. The author does not define explicitly what is meant by tactics and indeed points out that it is sometimes difficult to distinguish between synthetic strategy (the overall plan) and the tactics that are used to execute that plan. Since the distinction is blurred certain aspects of synthetic strategy are covered in the book. An immense volume of material is contained in the book, illustrating some of the most imaginative and effective ways that chemists have devised to overcome problems encountered during synthetic efforts towards an array of structurally different targets.

In the first chapter of the book convergent and reiterative processes are examined and examples are presented illustrating how, depending on the target molecule, either strategy can be efficient when used appropriately. In chapters 2 to 7 synthetic tactics are categorised under the following headings: Activity Modulation, Group Protection and Latent Functionalities; Umpolung; Tandem Reactions; Cyclic Arrays for Structural and Stereochemical Manipulations; Intramolecularisation and Neighbouring Group Participations; Template and Chelation Effects. Chapter 8 deals with 'Symmetry Considerations', including synthesis of symmetrical molecules and synthesis of unsymmetrical molecules starting from symmetrical precursors. Other

'Miscellaneous Tactics', including biomimetic routes are covered in chapter 9. The author clearly has problems placing some tactics into a single category and some are repeated in more than one place. Certain syntheses, for example Woodward's reserpine and B-12 routes, emerge as favourites of the author and portions of each are highlighted in different chapters. It also becomes apparent that the author has a particular bias towards the work of certain chemist and towards certain types of reaction, but this is by no means detrimental. It must also be emphasised that this book has great depth in terms of the diversity of structures that are considered and the array of different tactical manoeuvres that are highlighted.

Teachers of organic synthesis who will be familiar with a good deal of the material in the book and the structures of the synthetic targets will find the substance of the book reasonably accessible, but I think that graduate students and others who are entering the field of synthesis may have difficulty appreciating the messages which the author is attempting to convey. On many occasions a brilliant piece of work is presented without very much explanation of why the reaction(s) proceed in a particular manner or why the tactic is significant or superior to other approaches. There are also sections of text describing synthetic work without reference to structures and I could not find any value in this. In general the book would have been a much more powerful tool for those learning about synthesis if some extra explanation had been provided. This could happily have been included at the expense of the repetition of some reaction sequences under more than one category. A frustrating aspect of the presentation is that some structures are given without complete stereochemical representation, this again is particularly confusing for students. On the other hand, the compilation of key references spanning over 40 years of synthetic organic chemistry will be invaluable to students who are new to the field.

Presenting synthetic material, as this book does, in terms of tactical manoeuvres is both interesting and instructive. Indeed this book represents a valuable resource for students and teachers of organic synthesis, emphasizing a dimension of the subject which is not normally focused upon.

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