Book Reviews

Comprehensive Organometallic Chemistry. The Synthesis, Reactions and Structures of Organometallic Compounds. Volume 7. Edited by G. Wilkinson, F. G. A. Stone, and E. W. Abel. Pergamon Press, Oxford. 1982. xii + 729 pages.

Volumes 1 and 2 of "Comprehensive Organometallic Chemistry" dealt with the organic chemistry of the main-group metals and metalloids as well as of the elements of periodic groups 1B and 2B. Preparative aspects, structure, and bonding as well as reactivity were discussed. However, the coverage was not complete in that in most cases little if anything was reported about the application of the organometallic derivatives of these elements in organic synthesis. This was deliberate, for a separate volume of this series is devoted in its entirety to the applications of main-group organometallic reagents in organic synthesis. This was an important aspect of main-group organometallic chemistry right from its beginnings in the 1850s, Frankland having devoted some efforts to the study of the reactions of the then newly discovered organozincs with organic carbonyl compounds. With the advent of the Grignard reagents at the turn of the century, organomagnesium compounds became an important weapon in the arsenal of the synthetic organic chemist.

In the 16 chapters of the present volume we have a fairly up-to-date exposition of main-group organometallic chemistry as it relates to synthetic organic chemistry. On looking over the space allocated to various topics, one gets the feeling that organoboron chemistry is a bit overemphasized with its 253 pages. In contrast, organoalkali and organomagnesium chemistry together make do with a chapter of only 111 pages; organozinc, -mercury, and -copper reagents are covered in a chapter of only 69 pages. Organotin compounds are not mentioned at all. This is difficult to understand in view of their proven utility in organic synthesis in recent years.

Nonetheless, this is a worthwhile book, one that the organic chemists will find most helpful not only for the chemistry it brings but also for the many references to the original and review literature which are cited. The author of the group 1A/2A chapter, B. J. Wakefield, previously has written an excellent book on organolithium chemistry in which the synthetic organic aspects were covered in detail, and his chapter in the present book gives a nice summary of RLi and RMgX chemistry as applied to problems of organic synthesis.

The organoboron section that follows is led off by an introductory survey by H. C. Brown and is continued by M. Zaidlewicz with a very thorough discussion of all aspects of the hydroboration reaction. Full details on organoborane reactivity, especially as applied to organic synthesis, follow in several chapters by E.-I. Negishi. These are organized according to type of organoborane. Organoboranes are versatile, easy-to-prepare, in part, commercially available intermediates, and the organic chemist will find much in these chapters that can help him toward his goals in synthesis.

While organoboranes have in the main been confined to the research laboratory in their various organic applications, organoaluminums, the subject of the next chapter by J. R. Zietz, Jr., G. C. Robinson, and K. L. Lindsay, have become large-scale commercial chemicals, thanks to the chain growth reaction and Ziegler–Natta catalysis. On the other hand, they have not caught on in the research laboratory the way boranes have. Nonetheless, as this detailed chapter makes clear, there is much potentially useful organoaluminum chemistry that the synthetic chemist could apply with advantage—provided he is not deterred by the safety and handling problems associated with organoaluminum compounds as described by the authors.

Modern organothallium methodology as applied to problems of organic synthesis was developed in large part by A. McKillop and E. C. Taylor and their respective research groups. McKillop and Taylor have provided an excellent summary of this area with the focus on the oxythallation of olefins and the thallation of aromatic systems and the varied synthetic consequences of these reactions.

Group 4 is represented only by the long (145 page) chapter on organosilicon compounds by P. D. Magnus, T. Sarkar, and S. Djuric. The material presented is organized according to silane type: allyl-, vinyl-, alkynyl- (and propargyl- and allenyl-), and benzylsilanes; silyl enol ethers, silanes with Si heteroelement functionality, including silyl metallics; silyl hydrides, ylides, and acyls, with separate sections on Me_3SiI, Me_3SiCN, and Me_3SiN_3. Magnus and his coauthors have done a fine job of summarizing the important contributions of organosilicon chemistry to organic synthesis.

The last chapter, by W. Carruthers, which covers the organic compounds of zinc, cadmium and mercury and of copper, silver and gold, is perhaps the least satisfactory. In the zinc and cadmium sections the author has virtually ignored the significant French contributions to organic synthesis as assisted by the organic derivatives of these metals. In the mercury section the mercuration of aromatics and the use of arylmercurials in synthesis find no mention. Neither are Giese's interesting free radical additons as effected by the reaction of diverse RHgX with $NaBH_4$ and other hydrides in the presence of organic radical acceptor molecules included. The section on organocopper compounds and intermediates in organic synthesis is much better.

One may venture to predict that Volume 7 will be one which will find much use since its subject matter will be of interest and importance both to the organometallic and the organic chemist.

Dietmar Seyferth, *Massachusetts Institute of Technology*

Organometallic Chemistry Reviews; Annual Surveys: Silicon-Lead. Volume 14 of the Journal of Organometallic Chemistry Library. Edited by R. B. King and J. P. Oliver. Elsevier, Amsterdam. 1984. 536 pages. $152.00.

The latest volume of the *Journal of Organometallic Chemistry Library* brings four silicon annual surveys ["Silafunctional Compounds: Synthesis and Reactivity" for 1981 (531 references) and 1982 (506 references) by J. Y. Corey; "The Silicon–Carbon Bond" for 1981 (466 references) by G. L. Larson; "Organosilicon Reaction Mechanisms" (290 references) by F. K. Cartledge] and the 1981 organolead survey (169 references) by J. Wolters and D. de Vos. Although the 1981 surveys are rather late in appearing, they are nonetheless welcome. Organosilicon chemistry is such an active field, with so many papers appearing each year which deal with the various aspects of this important area that it has become almost impossible to keep up with its literature. Thus such comprehensive surveys are a great help to the organosilicon chemist.

All the chapters in this book are excellently done. They are well organized, and the material is clearly presented by means of text and many equations, schemes, and tables. The many references that are given will be invaluable to the reader who wishes to survey a given aspect more deeply. The authors of the various surveys appear to have been quite thorough; at any rate, those areas with which your reviewer is familiar are well done.

This book is well and attractively produced. It is impressive in every way, including price. Most of those who will wish to sample its wares will have to do so in their library.

Dietmar Seyferth, *Massachusetts Institute of Technology*

Gmelin Handbook of Inorganic Chemistry. 8th Edition. Ti. Organotitanium Compounds. Part 3. Mononuclear Compounds 3. U. Thewalt, volume author. A. Slawisch, volume editor. Gmelin Institut für Anorganische Chemie der Max-Planck-Gesellschaft zur Förderung der Wissenschaften and Springer-Verlag, Berlin/Heidelberg/New York. 1984. ix + 268 pages. DM 880, $341.50.

The bis(η^5-cyclopentadienyl)titanium halides are easily pre-