

Book Reviews

Organotransition Metal Chemistry: Applications to Organic Synthesis. By S. G. Davies. Pergamon Press, Oxford. 1982. xv + 411 pages. \$85.00, £42.50.

As stated by the author, this book is intended mainly for organic chemists who are interested in synthesis and who would like to acquire some familiarity with organotransition-metal chemistry. Emphasis is placed upon those reactions of organometallic compounds that are likely to be of importance in synthetic organic chemistry. The book has been written at a level that is suitable for advanced undergraduate or beginning graduate students or for other experienced organic chemists who have limited backgrounds in organometallic chemistry. As a consequence, this monograph is not appropriate for the organometallic specialist except, perhaps, as a convenient source of leading references.

With respect to specific contents, the introductory chapter covers, as expected, such topics as electron counting in transition-metal complexes, basic organometallic bonding schemes, electronic effects on organic ligands, stereochemical principles, and fundamental aspects of catalysis. The succeeding chapters discuss the formation of complexes, decomplexation of organic ligands, the use of complexes for the protection or stabilization of various organic moieties, nucleophilic attack on organic ligands, reactions of electrophiles with organometallic complexes, coupling and cyclization reactions, metal-promoted isomerization of organic compounds, oxidations, reductions, and carbonylation and related insertion reactions.

The strongest point of this book is its excellent organization. The contents of each chapter are arranged according to basic types of organic ligands which provides a very simple means for the casual reader to find material on a given subject despite the fact that the accompanying subject index is very brief. The author has employed a clear style of writing that is very readable. Typically, each topic is introduced with a few brief statements followed by several well-chosen examples in equation form. A quite useful summary of commonly employed starting materials is provided on pages 19 and 20. Also included are useful general rules for such phenomena as the site preference for nucleophilic attack on polyene or polyenyl complexes.

Some of the few shortcomings of this book are due in part to the author's choice of being concise and selective in his coverage rather than fully comprehensive. This choice is certainly justifiable in consideration of the targeted level of the book and in view of the much more complete works that are already available. However, a few omissions are more noticeable than others. For example, the discussion of the mechanism of the Wacker process (p 305) does not take into account the stereochemical and kinetic studies of Bäckvall. Structural limitations on the Noyori dibromoketone cyclization (pp 242 ff) are not discussed. The extensively studied and commonly employed copper hydride reagents are not included in the coverage of reductions by metal hydride reagents (pp 240 ff).

Other problems arise with respect to terminology. For example, the author uses the terms pericyclic addition and elimination rather than the more common (although sometimes misleading) oxidative addition and reductive elimination. The novice may be confused upon studying the author's chosen convention for electron counting (e.g., an alkyl ligand as a one-electron donor)

and then encountering the other commonly used convention in other sources (e.g., an alkyl ligand as a two-electron donor). No one convention should be regarded as being "correct", but the existence of each system should at least be acknowledged in order to prepare the reader for later encounters with either convention. Unfortunately, the related and very useful concept of assigning oxidation states is not specifically discussed.

Remarkably few errors are present, and the very small number of typographical errors that do exist are hardly worth listing here. However, the products shown on p 234 should not be called 3-allylpyridines, and the use of the term *cis* isomers in the middle of p 136 is unclear.

Overall, this book provides an excellent introduction to the field of organotransition-metal chemistry. The book has not been written in a very critical manner and does not include any homework problems, but it could nevertheless be recommended as a very good textbook. A major complaint may be raised against the publisher rather than against the author; Dr. Davies obviously devoted an enormous amount of time to prepare his manuscript in very clear, camera ready form with very few errors and with excellent graphics work, but Pergamon Press has done an obvious disservice to the author and his intended audience by placing an exorbitant price of \$85.00 on the book. For this unfortunate reason alone, the adoption of this book as a text for courses in organometallic chemistry is unlikely unless a considerably less expensive paperback version becomes available. For comparison purposes, the textbook by Collman and Hegedus (published by University Science Books), with which the present book is clearly competitive, contains in excess of 700 pages but is available at one-third to one-fourth the price in a hard-bound edition!

Paul M. Helquist, *State University of New York at Stony Brook*

Organic Syntheses. Volume 61. R. V. Stevens, Editor-in-chief. Wiley, New York. 1983. xvi + 177 pages. \$24.50.

Volume 61 of this tried-and-true series of organic synthesis "how-to" know-how will be welcomed, most certainly by organic chemists, but also by organometallic chemists who, after all, use lots of organic chemicals and also at times develop new routes to known and to new organic chemicals using stoichiometric or catalytic metal reagents.

The present volume contains 30 checked procedures in each of which the synthesis of a specific compound serves to illustrate a more or less generally applicable procedure. There is no recognizable theme; this is just a collection of unrelated compounds and syntheses. Organometallic chemists may be especially interested in the synthesis of benzyl isocyanide, the hydroboration of *trans,trans,trans*-1,5,9-cyclododecatriene, the preparation of hexamethyl Dewar benzene, the generation of vinylic lithiums by the tosylhydrazone procedure, and the use of chiral solvents as auxiliary agents in asymmetric synthesis. However, all of the other syntheses could well be useful at one time or another.

The authors, checkers, and the Board of Editors of "Organic Syntheses" deserve our thanks for their efforts in providing these valuable volumes which help greatly to make the life of the synthetic chemist a bit easier.

Dietmar Seyferth, *Massachusetts Institute of Technology*