Book Reviews

Organometallics in Synthesis. Edited by M. Schlosser. Wiley: Chichester, 1994, 603 pp., hardback. £ 60. $ 95. ISBN 0-471-93637-5.

This book comprises chapters on organoalkali reagents, titanium, copper, palladium, boron, aluminium and tin - a reasonable cross section of the most used organometallics / metalloids in organic chemistry. The origin of the book is a series of post-graduate workshops hosted by the editor in the late eighties, a similar source to that of the excellent 'Modern synthetic methods' series from the same publisher. The title book shares chapter layouts and some subjects (much updated and not generally by the same authors) with this series, but is properly typeset. Each chapter consists of an account of the chemistry together with illustrative experimental procedures. The extent of the later varies widely and is indicated below. Each chapter has its own character - exhaustive (alkali metals, titanium), good introductions (Pd), practical (Cu, B), and selective (Al, Sn) which gives the book an uneven feel, but all are useful. The work seems based around a 1991 completion date, although a few 1992 or even '93 references have been added.

The first chapter is on organoalkali reagents (M. Schlosser, 166 pages, ≈ 1200 references, 66 experimental procedures - ≈ 10% of the length) and starts with a historical introduction to organometallic chemistry before describing much of the theory underlying the formation, structure, and reactivity of polar organometallics. The preparation of alkali metal reagents by various methods is described in detail followed by handling techniques, stability, and analysis. This is a definitive account of the field. A chapter on 'Organolithium compounds - industrial application and handling' (F. Totter and P. Rittmeyer) seems rather out of place, but is interesting and has some useful data on thermal stability of organolithium reagents. The use of titanium in organic synthesis is well covered (M. T. Reetz, 84 pages, ≈ 500 refs, 40 exp. - 17%) with a good balance between theory and examples. The emphasis is on the chemo- and stereo-selectivity which can be obtained by titanation of main group organometallics including enolates. Olefination reactions, titanium tetrachloride mediated reactions of allylsilanes and enol silanes, and a brief (and already outdated) account of enantioselective reactions induced by chiral titanium complexes complete the review. The chapter on 'Synthetic procedures involving organocopper reagents' (B. H. Lipshutz, 100 pages, 250 refs, ≈ 120 exp. - about 70% of the text) is excellent. Virtually all the uses of organocopper chemistry in organic synthesis are included, and illustrated by experimental procedures. In each case a clear account of the theory underlying the reaction and choice of copper reagent, solvent etc. is given. Although rather dated by the 1991 cutoff the chapter on palladium chemistry (L. S. Hegedus, 74 pages, 220 refs, 19 exp. - ≈ 10%) is the best introduction currently available. Most palladium catalysed reaction types are mentioned and there are many practical tips such as when phosphines or other additives are needed. The chapter on organoboron chemistry (K. Smith, 44 pages, ≈ 115 refs, 39 exp. - ≈ 50%) is a contracted, but more readable, form of the authors 1988 'Organoboranes in organic synthesis' book (most of the preparations are identical) with a few more recent references. The main emphasis of 'Organoaluminium compounds' (H. Yamamoto, 24 pages, 75 refs, 3 exp. - 5%) is on their use as Lewis acids. Organotin chemistry (H. Nozaki, 44 pages, ≈ 220 refs, 9 exp. - 8%) is wide ranging, but lacks the depth of some of the other chapters.

Overall this is an excellent book which should be in all libraries and is highly recommended for personal purchase. It will find use as a day-to-day reference in the laboratory, a source of inspiration, and in advanced taught courses. I look forward to volume 2.

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Advanced Practical Organic Chemistry. By J. Leonard, B. Lygo, G. Procter. Chapman & Hall: London, 1994, 248 pp., paperback. £ 19.99. ISBN 0-7514-0200-1.

After many years of experience gained in the practical laboratory most research chemists have developed an excellent range of skills and abilities. In many cases this is gained by learning from our painful mistakes, especially in the early years. As each new intake of postgraduate students arrives and

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begins work the same range of mistakes and errors traditionally follows - the incomplete set of characterisation data, experiments not properly written up, the destruction of stills and the disappearance of reaction products during workup. If only, like transferring files between computers, experienced researchers could transfer all their knowledge to the new students then we could save countless hours of experimental time and effort. The authors of this publication, all experienced in working for internationally respected research groups, have made an excellent effort at the next best thing by writing an fine book which summarises most of the most important information you need to know both before you start and during your research career.

The scope of the book is very broad and covers all aspects of practical synthetic work including safety considerations, effective record keeping, preparation of solvents and reagents, anaerobic handling techniques, purification and characterisation. The section on record keeping stresses the critical importance of recording all observations and completing data sets for new compounds. Many very useful methods are given for the drying of important laboratory solvents and for the purification of certain reagents. The book thus retains a very close link to the work of the bench chemist without becoming overly wrapped up in theoretical issues. Some very valuable sections on more specialised areas such as large and small scale reactions, vacuum pumps, gases, gas and liquid chromatography, catalytic hydrogenation and ozonolysis are also included. The book is completed by a comprehensive introduction to the chemical literature. References and sources of further information are cited throughout.

The style of the book is concise and highly readable. Important points are made quickly and without deviation from the central issues. Whilst being comprehensive in their coverage, the authors have also recognised that each research worker has their own particular approach and favourite methods and techniques. The style of the book is therefore to suggest a method of working without becoming too inflexible. My guess is that experience will always be gained to some extent by trial and error, but if everyone was to read this book before they started their research work then much time and effort would be saved.

I would recommend this book as an essential purchase for all new research students in the area of organic synthesis, for whom it will prove to be an excellent investment. I would suggest that they should read all of Chapters 2 (safety), 3 (record keeping) and 15 (characterisation) before they begin any work. Much of the rest of the book may be used for reference when a particular technique is required. I would also recommend the book to all experienced research workers as a valuable source of information on particular laboratory techniques.

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