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Book Reviews

Preparative polar organometallic chemistry Volume 1

L Brandsma and H D Verkruijsse
Springer Verlag, Berlin. 1987. (240 pages) Soft cover. DM 78. ISBN 3-540-16916-4

This book is a practical manual containing descriptions of the preparation and synthetic uses of main-group organometallic compounds in which the metal is attached to an sp^2 carbon atom. The organic compounds covered are alkenes, allenes, cumulenes, arenes and heteroaromatic compounds. The book is the first volume of a series, although no information is given about future volumes.

The great strength of the book is the attention to detail in the practical descriptions. For example, on page 50 we are told that in the preparation of cyclohexenyllithium from 1-chlorocyclohexane and lithium in diethyl ether a deposit of lithium chloride on the metal can stop the reaction. The deposit can be removed by adding sharp pieces of broken glass. The authors even describe how to arrange the stirring to ensure that the lithium, which floats in ether, is scratched by the glass, which sinks.

In addition to the preparation of organometallic compounds themselves the book contains descriptions of preparative applications. Thus in the case mentioned above, conversion to cyclohexenecarboxaldehyde by reaction with dimethylformamide is described.

It is regrettable that the authors have not given some attention to transition-metal compounds. On page 42 we learn that syntheses via copper compounds are beyond the scope of the book, a point which should be emphasized since it is not clear from the title. Even within the main-group elements there is a tendency to concentrate on lithium compounds. A strange feature of the book is that there is no index in the conventional sense, although there is a comprehensive contents list and an appendix which consists of three tabular indices with many structural diagrams.

The book can be recommended to organic chemists looking for practical instructions on how to make and use organometallic derivatives of the main-group metals. There is a wealth of practical experience here, although in the cyclohexenyllithium experiment, I was left wondering whether a blast of ulta-sound might solve the problem more effectively.

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The chemistry of the metal carbon bond Volume 4 The use of organometallic compounds in organic synthesis

Frank R Hartley (ed.)
John Wiley & Sons, Chichester, New York, Brisbane, Toronto and Singapore (an Interscience publication). 1987. (1349 pages) £199. ISBN 0-471-90888-6

This work is the latest in the well-known Chemistry of Functional Groups series (Series Editor, Saul Patai) and the present volume (Vol. 4) of the organometallic section comes under the sole editorship of Frank R Hartley. It is an extension and companion to Volume 3 which covered the use of organometallic compounds to synthesize carbon–carbon bonds. The emphasis in Volume 4 is the synthesis of carbon–hydrogen and carbon–element bonds, although there is inevitably a considerable coverage of carbon–carbon bond formation dispersed throughout the work, particularly involving examples of more recent studies. The main division of the book is into Main Group and Transition Metal sections; in addition to organic synthesis, hydrogenation, C–H bond activation and supported metal catalysts are covered. The stated aim of the work is not to be encyclopaedic but to concentrate on more recent developments; however, most of the chapters do provide a full coverage of their topic and it is not usually necessary to read elsewhere in order to benefit from this.

The book is wide-ranging as evidenced by the chapter titles: Chapters 1 to 6 cover the preparation and use of Main Group organometallics in organic synthesis, i.e. organolithium and Group IA (J L Wardell), Grignard and Group II (C L Raston and G Salem), organoboranes (D S Matteson), organoaluminium (P A Chaloner), organothallium (S Uemura) and organosilicon compounds (E W Colvin). Similarly, there are chapters on organoiron (D Astruc), organorhodium (F H Jardine), organonickel (K Tamao and M. Kumada) and transition metal stabilized carbocations in organic synthesis (A J Pearson). For those with a special interest in catalytic aspects there are chapters on hydrogenation (D Parker), on the mechanism of homogeneous hydrogenation (F H Jardine), on saturated carbon–hydrogen bond activation (J R Chipperfield and D E Webster) and on the use of supported metal complex catalysts (F R Hartley).

Together with the companion Vol. 3, the present work provides a near-complete resource for workers in the area, for academics conscientiously searching for

up-to-date material for their lecture notes and for research students reading up their subject or writing the introduction to theses. Research institutes and public and private sector laboratories working in the organometallic area should also regard this work as a highly valuable source for their library shelves. The Editor set his authors the task of attaining reasonable coverage of their topics with moderate overlap between the chapters and with a concentration on more recent developments. They have certainly achieved this and in fact have also provided sufficient older background material for the general reader.

There is a good coverage of more recent references, a complete Author Index, and a helpful although not over-long Subject Index. Each chapter has a clear Contents List. The coverage is balanced and in the correct detail; it would be invidious to pick out any particular chapter for special comment as this would probably reflect the interests and taste of the reviewer, rather than inherent merit. The weakness of the book is its price; magisterial in coverage, it is also imposing in price at £199.00. This probably removes it from the range of individual chemists unless they have private means. Libraries and other institutional purchasers should regard it as an essential acquisition.

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An introduction to organometallic chemistry

A W Parkins and R C Poller
Macmillan Publishers Ltd, London. 1986. (252 pages) £9.95 paperback; £25.00 hard-cover. ISBN 0-333-36433-3; 0-333-36432-5

This book, which uses an integrated approach to discuss the organometallic chemistry of both Transition Metal and Main Group elements, contains nine chapters. The introductory chapter contains a valuable summary of reviews, journals and textbooks devoted to organometallic chemistry and, in each of the following chapters, the literature is divided into specialist references and general reading. Although there are half-a-dozen or so references to 1984 papers, in general the most recent citations involve 1983 articles.

Chapter 2 describes the various methods of preparation of organometallic compounds, including the direct reaction from the metal; syntheses from organometallic reagents; metallation; electrochemical processes; and preparative routes from alkenes, alkynes or arenes. Structure and bonding in organometallic compounds are discussed in Chapter 3, with sections on ***p***-bonded compounds, carbene, carbyne and ***n***-complexes, dynamic behaviour in solution and thermochemistry, whilst organometallic compounds as sources of carbanions are covered in Chapter 4.

Chapter 5 contains a survey of the reactions of organic groups bonded to metals in which the metal–carbon bond is retained and, in Chapter 6, the coordination chemistry of organometallic compounds is explained, with particular emphasis on its effects on structure and reactivity. Carbene chemistry involving organometallic compounds is described in Chapter 7.

The two final chapters are devoted to the applications of organometallics as reagents and intermediates in organic synthesis (Chapter 8) and as catalysts in reactions with organic molecules (Chapter 9). No mention is made of other important uses of organometallic compounds in modern technology, such as the silicone elastomers, alkylsilicon water-repellent treatments and organotin stabilizers for rigid PVC.

This is a clearly written book, free from typographical errors and the paperback edition is particularly reasonably priced. Senior undergraduate and postgraduate students, teachers and research workers will find it very useful.

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