

Book reviews

Organometallic Reagents in Synthesis

Paul R. Jenkins, Oxford Chemistry Primers, No. 3, Oxford University Press, Oxford, 1992, pp 92, £4.99
ISBN 0-19-855666-7

This useful short book is concerned with the synthetic applications of polar organometallic reagents in organic chemistry. It is one of a series of books that aim to provide a concise introduction to specific topics of chemistry and which contain the material that would normally be covered in a short undergraduate lecture course. It discusses the synthetic applications of various structural types of organometallic derivatives. After a brief introduction, the first chapter describes the synthetic uses of lithium alkyls and Grignard reagents contrasting the reactions of these two groups of compound. The treatment in this section and throughout the book is in terms of ionic reagents, and relatively few radical processes are discussed. The reactions of organocopper, organozinc and organoaluminium reagents then follow. There are a number of useful flow diagrams illustrating the general scope of these reagents. Although vinyl-Grignards are mentioned, the chapter on metallated alkenes concentrates on vinylaluminium reagents. A description of the synthetically useful reactions of metallated alkynes with alkyl halides, epoxides and carbonyl compounds constitutes the third chapter. Attention is then paid in the chapter on metallated aromatic compounds to the role of the substituent in directing the site of metallation and in stabilizing ortho metal atoms. This chapter is followed by a discussion of some of the simpler metallated heterocyclic compounds. The final chapter is concerned with α -hetero-atom-stabilized organometallic reagents, including amides, isonitriles, and particularly derivatives of dithianes.

The book is amply illustrated with examples and each chapter is followed by a list of articles for further reading. If there were to be a criticism, it is that the student is rarely shown why a particular organometallic reagent provided the solution for a synthetic step and what it was in the target molecule that led to an organometallic reagent being used – what are the structural clues in target molecules that “code” for organometallic syntheses? The book is well presented

and there are relatively few printing errors. The low price of this book, which should commend it to students, was made possible by the sponsorship of ICI plc, this is a very worthwhile gesture by a major chemical company. This book can be recommended as a useful introduction to organometallic compounds in synthesis.

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Sulfur Reagents in Organic Synthesis

Harcourt Brace, London, 1994. 200 pages £50
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This is the most recent addition to the Best Synthetic Methods series of books and follows the same format as previous volumes. The authors' aim to keep the book “small in size” is a sensible one and the book is well referenced with a significant proportion of the experimental details drawn from very recent literature reports. There are three main chapters which follow a brief introduction, Chapter two: Preparation of Organosulphur Reagents covers the preparation of thiols, sulphides, thio and dithioacetals, sulphoxides, sulphones, thiocarbonyl compounds and sulphonium salts and ylides. The widespread use of organometallic reagents for the preparation of organosulphur compounds is made clear in this chapter. For example the addition of organometallic compounds to elemental sulphur and the use of sulphur-based organometallic reagents as nucleophiles for the introduction of sulphur into organic molecules feature extensively here. The diastereoselective addition of organometallic reagents to chiral sulphoxides as a method for the synthesis of enantiomerically pure or enriched materials is also covered. A short section on sulphones is perhaps appropriate as there are alternative treatments dedicated to this important functional group. The major section in this chapter is on thiocarbonyl compounds and gives the reader a brief outline of the methods used to prepare a wide range of compounds.

Chapter three: Functional Modifications with Organosulphur Compounds is a relatively short chapter highlighting the use of sulphur intermediates in alkene synthesis; tin mediated radical deoxygenation; asymmetric reduction, the Pummerer rearrangement and an interesting section on miscellaneous reactions. The next chapter, entitled Organosulphur Compounds as Intermediates in Organic Synthesis, highlights the synthetic utility of organosulphur reagents, it is not surprising that over fifty percent of the book is dedicated to this aspect of organosulphur chemistry. The formation of carbon-carbon bonds is one of the most important sections in this chapter with a substantial proportion describing the utilisation of metallated organosulphur intermediates, addition of organometallic reagents to

thiocarbonyl compounds, uses of thioamides and esters, sulphur ylids, sulphur extrusion processes and pericyclic reactions.

As a brief introduction to this important area of chemistry the book achieves its aim. The authors are to be congratulated on their efforts which will be a useful reference text for practising synthetic chemists. It is an attractively presented volume which would be a useful addition to any chemistry library.

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