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Book Reviews

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BOOK REVIEWS

Patrick Metzner and André Thuillier, *Sulfur Reagents in Organic Chemistry*, Academic Press, London, 1994, ISBN 0-12-690770-6, £ 50.00, xvii + 200 pp.

The present book is a part of the series *Best Synthetic Methods* published by Academic Press with A. R. Katritzky, O. Meth-Cohn and C. W. Rees as series editors. Other titles in this series are “silicon”, “palladium”, “tellurium”, “lanthanides” and “iron compounds as reagents in organic synthesis”. This reviewer finds such an approach to synthesis turned the wrong way. If a chemist wants to introduce functionality in a molecule normally he will not mind whether this is done by means of a tellurium or a sulfur compound or some other reagent. The approach one finds in the Patai series on the chemistry of functional groups will be more interesting for a synthetic chemist. Academic Press should instead have asked the different specialists to write chapters in a series of books entitled “How to introduce ‘a hydroxyl group’, ‘a carbonyl group’, ‘a double bond’, etc. in a molecule”. In a series like that you could, in one book, find all the ways in which you could introduce *e.g.* hydroxyl groups by means of tellurium, iron, silicon or sulfur reagents.

This general scepticism concerning the scope of this series having been mentioned, it has to be said that Metzner’s and Thuillier’s book is an excellent handbook in sulfur chemistry.

The book consists of four chapters:

1. Introduction (3 pp.).
2. Preparation of Organosulfur Reagents (50 pp.).
3. Functional Modifications with Organosulfur Compounds (22 pp.).
4. Organosulfur Compounds as Intermediates in Organic Synthesis (104 pp.).

More than one hundred detailed procedures for a great variety of organosulfur reagents and various types of reactions with these reagents are included in this monograph. This makes the book a very useful laboratory manual, too.

In Chapter 2 one finds theoretical and practical information concerning the preparation of a great number of organosulfur compounds which is also of great interest for the practical organosulfur chemist who is not particularly interested in using the compounds for synthetic purposes.

In Chapter 3 the transformation of simple functional groups by means of sulfur reagents is discussed.

Chapter 4 is the most comprehensive one. It gives a deep insight into the use of organosulfur reagents in the organic synthesis of complex molecules. This chapter is subdivided into the following parts:

- C-C Bond-forming reactions.
- C=C Bond forming reactions.

Three-membered ring-forming reactions.
Pericyclic reactions of organosulfur compounds.

In several cases the use of sulfur reagents for the synthesis of complex natural products is mentioned.

The book has a reference list with 552 entries. Approximately 30% of the references are from the period 1990–93 which gives the reader valuable insight into the latest relevant literature concerning organosulfur chemistry.

Although many specialized books on various aspects of organosulfur compounds have been published in the past it is still difficult to find an up-to-date textbook which can be used in a broad course in organosulfur chemistry at an advanced undergraduate or graduate level. Metzner's and Thuillier's book is not such a textbook in organosulfur chemistry either. It can, however, provide very useful supplementary reading for such a course.

This book is, of course, a must for every sulfur chemist, but also for the organic chemist engaged in organic synthesis.

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M. R. Detty and M. B. O'Regan, *The Chemistry of Heterocyclic Compounds, Vol. 53, Tellurium-Containing Heterocycles*, Wiley, New York, 1994, ix + 511 pp., ISBN 0-471-63395-X, US \$ 185.00.

The present text which covers the literature up to 1993 (with the latest references dated 1994) is volume 53 in the series *The Chemistry of Heterocyclic Compounds*. It is structured according to the general format used in this series, i.e. with chapter division according to main classes of compounds and with first and second sublevels relating partly to subclasses and partly to type of information. The information presented covers all aspects of chemistry: synthesis, reactivity, and structural, physical and spectroscopic properties. Roman numerals are used for both chapters and first sublevels. This appears slightly disconcerting, in particular since the running titles refer only to the sublevels and the detailed table of contents is to be found on the front page of each chapter.

The actual content of this book fully conforms to the high general standard of the series. The senior author (MRD), himself an active contributor to the field of tellurium heterocycles since 1982, has succeeded in presenting a critical and comprehensive survey of the literature. In particular the statements concerning the similarities and dissimilarities between the tellurium and the lighter-chalcogen heterocycles constitute a both rare and much needed commodity.

An introductory chapter stating distinguishing features and areas of practical utility is followed by five chapters aimed at a systematic presentation of the individual classes of tellurium heterocycles. The role of tellurium-containing heterocyclic compounds in the very active research area of organic donor molecules receives attention in a separate chapter. The

co-author (MBO'R) with a background in the organic chemistry of transition metals has contributed the last chapter on the intriguing phenomenon of hypervalent bonding to tellurium.

In conclusion this very inspiring text is highly recommended to any chemist even remotely connected to the field of heterocyclic tellurium chemistry.

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P. Page (Ed.), *Organosulfur Chemistry, Synthetic Aspects*, Academic Press, London, 1995, 277 pp., £55, ISBN 0-12-543560-6.

This book contains five chapters dealing with various aspects of organosulfur chemistry. The first, by G. Solladié and M. Carmen Carreno, describes recent progress in the use of "Optically Active β -Keto Sulfoxides and Analogues in Asymmetric Synthesis". The main methods for preparing the various chiral sulfoxides are first presented, followed by a discussion of the stereoselective reduction of β -keto sulfoxides and its application to the total synthesis of natural products. The last section reports on the Diels-Alder cycloaddition of optically active alkenyl sulfoxides and sulfanyl dienes. A fair proportion of the subject matter draws from the authors' significant contribution to this field.

The second chapter, written by D. Crich, concerns "Homolytic Reactions at Sulfur". This is a vast domain that reflects the recent explosive growth in the application of radical based methods in organic synthesis. The material is unfortunately treated in an unbalanced manner that does not reflect the relative synthetic or mechanistic importance of the various processes. Thus, fourteen pages are devoted to reactions of thiyl radicals with numerous examples given, but the richer and synthetically much more useful radical chemistry of the thiocarbonyl group is expedited in a scant three pages. The reader is dismissively referred to "the authoritative review of the area" [*sic*] by the author himself published in 1989 and now outdated. This is a pity since this part includes the exceedingly useful Barton deoxygenation and decarboxylation reactions (the mechanisms for both of these reactions pictured in Schemes 2.108 and 2.109 are incomplete). The more recent dithiocarbonate group transfer process is summarized in one line with no diagrams.

The third chapter by C. M. Rayner deals with "Synthetic Transformations Involving Thiiranium Ion Intermediates". Although the title might suggest at first sight a very specialized topic, this impression rapidly vanishes with the variety and elegance of many of the transformations that are reported. This carefully drafted chapter begins with an initial overview of the area, followed first by an outline of reactions leading to thiiranium ions and then by a detailed description of the various ring opening processes that dominate the chemistry of these species.

The fourth, and by far the longest chapter, is the one on "Trends in the Chemistry of 1,3-Dithiobetals" by W. W. Wood. The length reflects the amazing variety in the way chemists

have exploited the dithioacetal group in organic synthesis. A large section deals with the synthesis of 1,3-dithioacetals, mostly as protecting groups for aldehydes and ketones. In this respect, some of the tables in this section are repetitive (same substrates, but different Lewis acid catalysts) and could have been condensed. The many chemical transformations of 1,3-dithioacetals are presented under two headings. The first describes mostly reactions where the dithioacetal unit remains intact, with some emphasis on the chemistry of anions stabilised by the dithioacetal group. A few radical reactions are also included in this section. Under the second heading one finds a compilation of methods for the cleavage of 1,3-dithioacetals in order to regenerate the corresponding carbonyl derivative, as well as some of their less familiar reactions such as their conversion into *gem*-difluorides. One interesting and useful feature of this chapter is the inclusion of reactions and compounds taken from the patent literature to which the author has access as an industrial chemist.

The last chapter is a review of the "Chemistry of Thioaldehydes", written by R. Okazaki, a main contributor himself to this area of research. This chapter is in two parts, the first dealing with transient thioaldehydes and the second with stable and isolable thioaldehydes. The various methods for the preparation of these important, but so far little used compounds, as well as their spectroscopic properties and typical reactions are presented in a clear, detailed manner.

Like many a book on chemistry, this one has its fair share of innocuous misprints (a blatant one on p. 90, but other minor, mostly spelling, errors may be found on pp. 10, 13, 45, 55, 120) and more serious errors in the drawings (Schemes 1.26; 1.27; 1.39; 1.49; 1.56; 4.1; 4.11; 5.22). This book contains on the whole a very welcome collection of reviews on important yet varied synthetic aspects of sulfur chemistry. It is reasonably priced and thus accessible to both libraries and the private shelf of the practising organic chemist.

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