

# Book Reviews

**Organic Chemistry: A Comprehensive Degree Text and Source Book.** By Wolfgang Walter (University of Hamburg, Germany), edited and translated by Douglas Lloyd (University of St. Andrews, Scotland). Albion Publishing, Chichester, U.K. 1997. xx + 1037. 17 × 24 cm. \$45.00. ISBN 1-898563-37-3.

This book contains about 900 pages of text, 40 pages of appendix material, and two indexes, one consisting of individuals referred to in the text and the other a subject index. The point of departure is purification methods, chemical bonding theory, and spectroscopic methods. In the latter case, the level of presentation is similar to that in typical American texts, although the material is presented in a denser, less pictorial style.

Chapter 2, entitled Aliphatic Compounds, runs 330 pages. It starts with alkanes, alkenes, and alkynes. The early part of the chapter also includes sections on hydrocarbons as fuels and vinyl polymerization; then, functional compounds including alcohols, halides, ethers, sulfides and sulfoxides, nitroalkanes, amines, organophosphorus compounds, organometallics, aldehyde, ketones, carboxylic acid derivatives, and polyfunctional compounds are covered. This chapter's scope then is roughly equivalent to the first two-thirds of a typical introductory organic text. Topics such as Markovnikov's rule, nucleophilic substitution, *cis* versus *trans* addition, the Woodward Hoffman rules, chirality, and fundamental preparative methods are described. Some reaction mechanisms are described by arrow schemes, but most of the reactions are presented in the reactants → products format. Again, the presentation is compact. Section 2.20, Organometallic Compounds, for example, covers lithium, magnesium, zinc, titanium, mercury, aluminum, lead and tin compounds in 10 pages.

Chapter 3, Alicyclic Compounds, is just under 40 pages. It includes a section on conformational analysis of cyclohexanes, but the idea of conformational free energy is not introduced. Chapter 4 deals with structure and reactivity of carbohydrates. Chapter 5, Aromatic Compounds, is about 90 pages in length. This chapter discusses aromaticity and electrophilic aromatic substitution and then discusses various classes of derivatives and their reactivity. There is a 10 page section on dyestuffs following the material on diazonium chemistry. Hückel's rule is introduced at the very end of the chapter and mainly discussed in the context of nonbenzenoid compounds. The final chapters deal with Isoprenoids, Heterocyclic Compounds, Amino Acids, Peptides and Proteins, Nucleic Acids, and Enzymes, respectively. Fundamental concepts and techniques of molecular biology, such as reverse transcriptase, restriction cleavage, ligation, and the polymerase chain reaction are introduced in the nucleic acid chapter. Throughout the book there are brief descriptions of the physical properties and source of specific substances, including a substantial number of drugs and natural products. The references in the text are primarily to review articles and monographs. One of the appendices lists "Named Reactions and Concepts."

I would judge the depth and sophistication of the material to be comparable to that found in typical introductory American texts, but there is a great deal more specific descriptive material. There is not a lot of mechanistic treatment. There is good coverage of classical synthetic methodology. One would be pleased to have a bachelor's degree recipient or first year graduate student who was at the level of preparation this text offers but there would be some gaps. Such a student would have excellent grounding in classical structure and reaction chemistry, but not in more recent synthetic methodology or synthetic strategy. For example, I did not find any discussion of stereoselective aldol reactions. The concept of retrosynthesis is introduced in a paragraph on the synthesis of saccharin, but so far as I could see, it was not used thereafter. The student would also not have much physical organic chemistry, but would have more exposure to practical uses of chemical substances than is typical of standard texts.

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**Reductions in Organic Chemistry, Second Edition.** By Milos Hudlicky (Virginia Polytechnic Institute and State University). American Chemical Society, Washington, DC. 1996. xxvi + 429 pp. 15 × 22.5 cm. \$109.95. ISBN 0-86980-893-1.

Imagine a one-volume, concise compilation of every type of reduction ever reported and you begin to have an idea of the value of Milos Hudlicky's *Reductions in Organic Chemistry, 2nd Edition*—a monograph having the information compactness of a neutron star.

This 430-page volume is divided into the sections "Categories of Reductions," which covers the history and general utility of specific reducing agents (48 pages), "Reductions of Specific Types of Organic Compounds," which details the methods for the reduction of functional groups (193 pages), "Correlation Tables," which is an index in table format for the preceding section (41 pages), and "Procedures," which cites procedures (similar to *Organic Reactions* style) and techniques for reductions (30 pages). About 80 such procedures are delineated, including tangential preparations of SmI<sub>2</sub>, hexylchloroborane–Me<sub>2</sub>S, Zn(BH<sub>4</sub>)<sub>2</sub>, and several transition metal catalysts. This monograph is replete with hints, tips, and other tidbits about reduction methods, and each chapter in the large main section is followed by a brief summary. The book concludes with a set of 1500 references, a bibliography of reduction reviews, and extensive author and subject indices (62 pages).

Coverage is "through the end of 1993," although this reviewer found several missing citations (e.g., the partial reduction of amides and lactams to enamines with DIBAL, the reduction of aryl iodides with NaH, the selective reduction of aldehydes with triacetoxyborohydride, the stereoselective reduction of  $\beta$ -hydroxy ketones to 1,3-diols with acyloxyborohydrides, the reduction of nitriles to primary amines with sodium borohydride/trifluoroacetic acid, the reduction of nitro compounds to nitrenes with trialkyl phosphites, and the reduction of azides to amines with triphenylphosphine (Staudinger reduction), all of which were published prior to 1993). Some other entries are incomplete. Thus, the reduction of quinoline with sodium cyanoborohydride/acetic acid is cited but the same reduction of isoquinoline is not (page 74). Nevertheless, despite these few omissions, this book is a treasure-trove of reduction methods and practices. Only a few errors were noted: e.g., "most air" (p xxiv), "aldonic acids to aldoses" (incorrect) (p 35), "Hexamethylphosphoric" (p 59), incorrect indole reduction products shown in Table 3 (p 252). Also, on page 29 there is mention of the use of ethyl acetate to decompose lithium aluminum hydride reduction mixtures, but, in the case of the reduction of amides to amines, this can lead to acetylation of the product.

This book can be highly recommended to all practicing organic chemists. If one is planning a particular reduction reaction for the first time, then this is the place to start.

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**Chemistry, Biological and Pharmacological Properties of African Medicinal Plants.** By K. Hostettmen, F. Chinyanganya, M. Maillard, J.-L. Wolfender [Universite de Lausanne, Switzerland (Hostettmen, Maillard, Wolfender), and University of Zimbabwe (Chinyanganya)]. University of Zimbabwe Publications, Harare, Zimbabwe. 1996. xvi + 336 pp. 15 × 33 cm. \$50.00. ISBN 0-908307-59-4.

Most conference proceedings become outdated even before they leave the press, but the proceedings of the first IOCD-Symposium on Chemistry, Biological and Pharmacological Properties of African Medicinal Plants will remain a reference publication for a long time. This symposium volume contains the plenary lectures and some contributed papers on different aspects of research on African medicinal plants presented at the conference held in Zimbabwe in 1996. The contributors are among the best in the field of phytochemistry and pharmacology of natural products. The book has 24 chapters dealing with the chemistry and biology of African medicinal plants.

There are 16 excellent review articles on diverse topics, ranging from methods for the search of bioactive plant constituents to specific therapeutic classes, such as anticancer agents, wound-healing agents, and anti-malarial compounds. Some of the papers focus on the

chemistry and standardization of herbal products used in African traditional medicine and the production of phytomedicines, while others deal with the use of modern analytical techniques in the identification and structure elucidation of the active constituents of several medicinal plants. It is this mix of academic research papers with the more practically oriented contributions that makes the book a very important and useful reference source. Chapter 1, written by G. Brigmann, discusses the isolation and chemistry of the pharmacologically exciting biaryl and quaternary alkaloids. The second chapter is an article entitled "Strategy in the Search for Bioactive Plant Constituents", with useful practical hints for investigators interested in natural products as sources of new biologically active molecules. It discusses the methods for the selection of plant species, simple bioassays for the screening of plant extracts, and the chemical screening of biological samples by combined LC/UV, LC/MS, and LC/NMR. The authors of the chapter, Hostettmann, Wolfender, Rodriguez, and Marston, gave excellent examples from their own work of the application of these techniques in natural product research. Chapter 3, contributed by Gordon Cragg and his colleagues at the National Institute of Health, describes the highly successful international program at the NCI that focuses on the discovery and development of anticancer and anti-AIDS drugs from natural products. The article discusses many compounds in preclinical stages of development and outlines the NCI's method of international collaboration. The chapter on wound healing by Onayade (O.A.), Onayade (A.A.), and Sofowora is a very interesting reading. It gives a good summary of the subject and brings together most of the published work on plants used for wound healing in a very easy-to-use tabular form. Gbeassor and his colleagues in chapter 12 give several examples of the development of ethical phytomedicines in the small west African nation, Togo. Chapter 13, by van Puyvelde, addresses the problems of development and production of standardized phytomedicine in Rwanda and provides a good illustration of the possible contribution of natural product chemistry and pharmacognosy in alleviating the medicine supply problem in very poor countries. Another example of this approach was provided in Chapter 14 by Diallo, Paulsen, and Hvemmm on the production of phytomedicines in Mali.

Although the book focuses on African plants, the coverage is by no means limited to that continent. The plants are used to illustrate issues that will be of interest to anybody engaged in the search of bioactive compounds from plants, and the techniques discussed will be valuable to many research scientists. The book is well edited and will be an excellent collection for natural product chemists, pharmacologists, and anybody interested in the constituents and activity of medicinal plants.

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