

# Book Reviews

**Fieser's Reagents for Organic Synthesis, Volume 18.** By Tse-Hok Lo (National Chiao Tung University, Republic of China). John Wiley and Sons, Inc., New York, NY. 1999. xii + 504 pp. 15 × 22.5 cm. \$79.95. ISBN 0-471-24477-5.

*Fieser's Reagents for Organic Synthesis, Volume 18*, provides a review of the reagent literature from 1993 and 1994. Professor Lo continues the strong tradition of this series by presenting concise descriptions of relevant examples during this time period. The decision by the author to cover more examples by eliminating lengthy explanations works well, and the text should be clearly understood by any graduate researcher. The structural formulas are very clear and consistent. Each example is referenced, and a useful list of reference abbreviations is provided to assist with deciphering the condensed citations. A particularly nice feature, absent from Volume 17, is Professor Lo's addition of cross references for reagents to other volumes of this series that have appeared since the last collective index. A complete author and subject index are also presented as part of the text. Professor Lo has maintained the quality of the series, and this volume should be of particular value and interest to any practicing organic chemist. This volume certainly should be included in any institutional library and will probably be a desirable addition for organic chemists who have maintained a personal collection of the rest of this series.

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**Protective Groups in Organic Synthesis, 3rd Edition.** Theodora W. Green (The Rowland Institute for Science) and Peter G. M. Wuts (Pharmacia and Upjohn Company). John Wiley & Sons, Inc., New York, NY. 1999. xxi + 779 pp. 15.5 × 23 cm. \$84.95. ISBN 0-471-16019-9.

It would be wonderful if there were no need for this book. Were this so, it would provide a clear indication that organic synthesis had reached a level of sophistication where each transformation was so selective that protecting groups were unnecessary. Unfortunately, this is not the case. This acknowledged, the 3rd edition of *Protective Groups in Organic Synthesis* provides an invaluable resource for all practitioners of organic synthesis. It lives up to the high standards one has come to expect of this book based upon the quality and utility of the first two editions. It is rich with useful detail and is an exceptionally important resource.

Both electronic and manual searches through the end of 1997 led to the addition of 2349 new citations and the inclusion of 348 new protecting groups. New sections dealing with the protection of phosphates and the alkyne-CH unit have been included. The index is thorough and appears to be complete. This is much appreciated, as it can safely be used to guide one's search for the most useful

protecting group. Brief but useful discussion concerning issues of selectivity often prefaces a section dealing with a given protecting group (e.g., acetonide formation, p 207). Helpful commentary designed to assist in choosing among alternatives often accompanies the list of methods for the formation and removal of a given protecting group (e.g., acetonide formation and cleavage, pp 209–213).

The book is far more than a compilation of methods and procedures. In many ways, it is a critical review that carefully assesses the existing literature. This is clearly one of the features that makes the book so valuable. The book is not expensive, by today's standards. Without a doubt, it belongs on one's bookshelf.

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**Understanding Mass Spectra. A Basic Approach.** By R. Martin Smith (Wisconsin Department of Justice Crime Laboratories) and Kenneth L. Busch (Technical Editor, School of Chemistry and Biochemistry, Georgia Institute of Technology). John Wiley & Sons, Inc., New York, NY. 1999. xvii + 290 pp. 15.5 × 23.5 cm. \$59.95. ISBN 0-471-29704-6.

Mass spectrometry, which brought us in the early years of this century the detection of isotopes, measurement of their accurate mass and natural abundance, has now become widely applied in almost all areas. It continues to develop with spectacular increases in sensitivity, accuracy, mass range, and introduction of novel ways of ion formation that enable now to characterize almost all classes of organic and "biological" compounds. Consequently, there is a real proliferation of textbooks and journals dedicated to all aspects of this technique. Teaching of mass spectrometry to beginners, especially in terms of the information provided, should underline its relative simplicity. Once the formation and mass analysis of ions are adequately explained, understanding of major mass spectral features requires only the familiarity with elements and their isotopes as well as experimental rules of ion fragmentation that are equally simple. Quite frequently, mass spectra help only in finding or confirming the expected molecular weight (MW) and the elemental composition. This requires proper identification of the molecular/pseudomolecular ion (or its simple elimination products), verification of its position with regard to the charge multiplicity, mass (accurate or nominal), and the relative intensities of isotopic components. This limited use of mass spectrometry, solely for the determination of MW, tends to disregard structural information that may be contained in the fragmentation pattern such as that obtain with electron impact ionization.

The book by R. Martin Smith, written with the editorial help of Kenneth L. Busch, stresses the structural utilization of mass spectra beyond the sole determination of MW and is illustrated by the analysis of small molecules,

especially those that are amenable to gas chromatography–mass spectrometry (GC–MS). The implementation of simple experimental rules that govern ion fragmentation is discussed here for an informative set of closely related examples and problems, mostly the analysis of the illicit drugs that apparently comes from the author's own experience. Useful techniques required in assessing spectral information and quality of spectra are also given, together with many practical suggestions that may help beginners in their own struggle with spectra and instruments.

Eight chapters describe instrumentation, isotope abundance, ionization and kinds of ion species, neutral loss and characteristic ion series,  $\alpha$ -cleavage reactions, ion rearrangement reactions, guidelines for proposing ion fragmentation mechanisms, and, finally, the use of mass spectra in structure determination. These topics are introduced employing related examples and multiple problems with answers discussed at length in the ninth and last chapter. Strikingly, there is only a short list of references referring primarily to the author's own publications. The reader cannot find any guidance to other texts extensively covering organic mass spectrometry since the early sixties. This vast literature, importantly, already provides explanations of all topics covered here at various levels of sophistication. Although repetition cannot be considered as a shortcoming of a textbook, a striving for the lucid organization of material as well as providing complete and updated information are both highly desirable. This book, however, seems to incorporate only material used in class work, with all the resulting limitations resulting from time constraints and the level of the participants. This cursory approach is especially apparent in the introductory chapters. Thus, apart from a discussion of quadrupole spectrometers, there is only a brief description of other types of instruments, only a limited discussion of ion structures and energetics, and no information concerning the most recent developments. For instance, there is no mention of fast GC–MS enabled by the use of time-of-flight instruments or of the considerable increase in the relative intensity of molecular ions in the electron impact ionization possible with the supersonic molecular beam. Similarly, the use of derivatives that may considerably help in enhancing clarity of spectra, including the identification of molecular ions, is not covered at all.

The second chapter provides an extensive discussion dedicated to the calculation of relative intensities of isotopic ions. This discussion, surprisingly, assumes only a minimal knowledge of general chemistry and the theory of probability, leading to unnecessarily complex and quite convoluted explanations. Although there is a table listing natural abundances and accurate mass of "some common elements", it omits the minor isotopes of hydrogen (deuterium) and oxygen ( $^{17}\text{O}$ ). In apparent agreement with this partial table, there is an incorrect statement on p 58 that "neither hydrogen or oxygen have isotopes that contribute to the  $(M+1)^+$  ion". Only on p 153 can one find an explanation of what "deuterium" is, with no mention of its presence in Nature. One should notice, however, that for the elemental composition of sucrose octa-acetate  $\text{C}_{28}\text{H}_{54}\text{O}_{19}$ , taken as an example, deuterium and  $^{17}\text{O}$  contributions to the ion  $(M+1)$  are 1.7 and 2.2%, respectively. This compares with 96.1% from the  $^{13}\text{C}$  contribution (such a molecular ion is easily observable with alkali metal attachment in MALDI and FAB spectra). It is also not true that the calculation of the Newton's binomial "is too complex to use on a routine basis" (p 61). Only a few strokes are required with a scientific calculator and almost all specialized mass spec-

trometry software includes dedicated programs to do such calculations for the multi-isotopic elements and the relatively complex elemental compositions. In the same chapter, there is also an incorrect use of the term "absolute mass" that in fact signifies the "accurate or precise mass".

My own experience, however, indicates that such simple features as isotope peaks are not universally understood by many of those that use (or pretend to use) mass spectra. The same is true for the distinction of the monoisotopic and average mass. Consequently, I share the author's frustration that results here in an overly expanded discussion and a tendency to oversimplification.

In summary, chapters dedicated to the explanation of ion fragmentation and its use in structural assignments provide well discussed examples and problems and are very interesting and useful. Still, with many other textbooks available, even for those who plan to use "an old fashioned" electron impact ionization as the only approach, this book cannot be recommended as the sole source for introductory teaching.

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**The Cross Name Index to Medicinal Plants, Vol. IV: Plants in Indian Medicine A–Z.** By Anthony R. Torkelson (Monsanto Company, St. Louis, MO). CRC Press, Boca Raton, FL. 1999. ix + 547 pp. 21.5 × 27.5 cm. \$350.00. ISBN: 0-8493-1085-7.

The literature on Indian medicinal plants is growing rapidly, and the compilation under review is a welcome sourcebook for investigators seeking the identity of the ferns, gymnosperms, and flowering plants used medicinally on the Indian subcontinent. By means of cross-referencing 12 600 common names for 1935 species of plants used mainly in, but not confined to, the Ayurvedic system, this publication necessarily affords us a very formulaic, yet worthwhile, presentation of the basic plant materials in medicines having an ancient and complicated lineage.

The book under review is not to be mistaken for CRC's excellent *Handbook of Ayurvedic Medicinal Plants* by L. D. Kapoor (1990). The operational word for the Torkelson book is "Index", and in the context of being an index of Indian medicinal plant names derived from various literature sources, it is true to its objective. The first section consists of alphabetically indexed common names of plants, followed by a section with the scientific names alphabetically arranged by genus, along with a listing of each plant's common names from among 111 possible languages and dialects. All the names from Kapoor's CRC Ayurvedic handbook appear to be included, but the fact is incomprehensibly not mentioned as such in the introductory "Concept and Construction" section.

The volume does not purport to be an authoritative database on taxonomy, although selection of scientific names relied upon the Missouri Botanical Garden's taxonomic database, VAST (Vascular Tropicos). Yet, the book when in press would have benefitted from a deeper botanical scrutiny. In an introductory paragraph, "Fernald" and "Dicotyledoneae" are misspelled, the latter word continuously used in its altered state hundreds of times throughout

the book. Misspellings of the genera *Asarum*, *Cananga*, *Dracocephalum*, *Liquidambar*, and *Stachytarpheta* are sometimes, and sometimes not, carried over verbatim to the cross-referenced common names section which opens the book.

Only two family designations seem to be amiss: *Ximenia* is in Olacaceae (not Oleaceae); *Sansevieria* is in Dracaenaceae or Liliaceae (not Haemodoraceae). The sequence of *Camellia* species is reversed due to a misspelling of the genus under *C. sinensis*; a similar misspelling of *Populus* causes *P. alba* to be located two pages distant from the other poplar species. Regarding the inevitable name changes, readers should be aware that *Limonia crenulata* (Rutaceae) is now *Naringi crenulata* (Roxb.) Nicolson; *Quisqualis indica* (Combretaceae) is *Combretum indicum* (L.) DeFilipps; *Andrographis echioides* (Acanthaceae) is *Indoneesiella echioides* (L.) Sreemadhaven; *Amorphophallus campanulatus* (Araceae) is *A. paeoniifolius* (Dennst.) Nicolson; and *Hymenodictyon excelsum* (Rubiaceae) is *H. orixense* (Roxb.) Mabberley.

Can any such large-scale coverage be totally inclusive? Four taxa of *Cinchona* (Rubiaceae) used as sources of a medicinal residue after the removal of quinine, employed in Ayurvedic, homeopathic, and Unani medicine in the state of Tamil Nadu, are not cited, nor are various aquatic

*Marsilea* and *Azolla* fern species used in Ayurveda and Siddha systems in that state. An article by B. Manyam on treatment of dementia in Ayurveda (*J. Alt. Complement. Med.* 1999, 5(1), 81–88) cites two ingredients of the “Cyavanaprash” stamina-increasing preparation, *Roscoea procera* (Zingiberaceae) and *Malaxis muscifera* (Orchidaceae), which are not present in the *Index*. On the other hand, Dr. Torkelson has mercifully spared us from many superfluous names by restricting the entries to those that have been cited in at least two reliable sources.

This book is an indispensable reference and will need to be consulted often for corroboration of plant names used in the literature of Indian medicinal plants, many of which still await chemical investigation and verification of their healing properties.

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