Book Reviews

Pharmaceutical and Medical Applications of Near-Infrared Spectroscopy. Practical Spectroscopy Series. Volume 31. By E. W. Ciurczak and J. K. Drennen III. Marcel Dekker, New York. 2002. ix + 192 pp. 16 × 23.5 cm. ISBN 0-8247-9453-2. $135.00.

The book is particularly relevant to those involved with pharmaceutical processing and who are interested in alternative ways to monitor uniformity of granulation processes, uniformity of film coating processes for controlled release beads and granules, or measurement of moisture content. Clinical chemists might find this book interesting for its clinical applications. Near-infrared spectroscopy (NIS) is a branch of spectroscopy covering the spectral range from 700 to 2500 nm. A search of the NIS literature reveals a rapid growth over the past 2 decades and the appearance of its own journal. NIS is best utilized for studying OH, NH, and CH absorptions and gives a reflectance pattern characteristic of the sample being analyzed that can be used for qualitative or quantitative analysis.

This book is primarily devoted to pharmaceutical applications (75%) and consists of seven reviews: Basic Principles and Theory (14 pp); Blend Uniformity Analysis (monitoring pharmaceutical granulation and processing) (18 pp); Granulation, Drying, and Coating (monitoring the uniformity of these processes) (22 pp); Pharmaceutical Assays (measurement of hydration, moisture content, active ingredient, blend homogeniety, polymorphism, and crystallinity) (18 pp); Validation Issues (quality assurance and ICH guidelines for NIS methods) (28 pp); and Medical Applications (clinical applications for measurement of blood glucose, blood oxygenation, and tissue, for example, fetal lung maturity, blood chemistry, and Doppler imaging) (50 pp). The reviews summarize the literature and are not intended to be comprehensive. Most of the applications rely on principles of reflectance spectroscopy rather than absorption spectroscopy. Although each chapter is liberally referenced with current citations, there is inconsistency in the use of titles between chapters for the articles referenced. Without titles, searching for the relevant article becomes tedious. The subject index is more than adequate to locate areas of interest.

Although the book is pricy ($0.70/page; $135.00), it would most likely be of interest to those working in pharmaceutical processing and it offers an exciting alternative for studying the homogeneity of blending and granulation, polymer coating for controlled release products, and moisture analysis. Clinical chemists might find use for NIS in Doppler imaging or studying the health of tissue. The authors have largely succeeded in presenting an overview of NIS and its applications in pharmaceutical processing and clinical chemistry. The value of this book is in the applications of NIS as an alternative to other methods used in pharmaceutical processing or clinical chemistry.

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Stereochemistry. By David G. Morris. Wiley-Interscience/Royal Society of Chemistry, New York. 2002. vii + 170 pp. 19 × 24.5 cm. ISBN 0-471-22477. $34.95.

This self-instructional primer surveys fundamental concepts and nomenclature of undergraduate-level stereochemistry in a concise and systematic fashion. Over the course of the eight module-style chapters, basic chemical bonding theory and conformational free energy states lead into reaction mechanism-based predictions of product stereochemistry, and conclude with spectroscopic properties of stereoisomers. The book commendably teaches stereochemistry in an easily understood and engaging fashion.

A panel of aims precedes each chapter. Extensive use of topographic figures lends well to the reader's stereovision. Colored sidebars reinforce key points, and specific exercises requiring molecular models punctuate the text. Most of the chapters conclude with (1) a series of *worked* problems, (2) a panel summarizing key points, (3) additional problems with answers compiled in the back of the volume, (4) references, and (5) additional sources for further reading. The references contain both seminal contributions to the field as well as late-breaking advances befitting a journal club. Page constraints dictated restriction of the glossary and an addendum to Web posting.

The preface would benefit from a brief statement regarding the available types of molecular model sets most appropriate to the exercises that follow. The specific compounds used to illustrate principles are drawn primarily from organic mechanism and biochemistry literature, e.g., a consideration of Decalin conformations and their relationship to steroid isomerism. However, in such prominently covered areas as prochirality and enzymatic resolution, practical examples in drug metabolism would have broadened the reach of this book. Chiral chromatographic methods are all but omitted, and molecular symmetry elements are mentioned only in a cursory fashion. Further, the index does not capture many of the terms addressed in the text.

I conclude that this book serves very well its stated function as an introduction to stereochemistry. The

author has created one of the most easily comprehensible treatments of this subject.

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Houben−Weyl Methods of Organic Chemistry. Volume E22A. Synthesis of Peptides and Peptidomimetics. Edited by Murray Goodman, Arthur Felix, Luis Moroder, and Claudio Toniolo. Georg Thieme Verlag, Stuttgart, Germany. 2001. xxvii + 901 pp. 18 × 26 cm. ISBN 3 132 19604 5. 1840 euro.

The year 2001 marked the 100th anniversary of the first organic synthesis of a peptide by Emil Fischer. This is the first volume of a four-volume series on the synthesis of peptides and peptidomimetics, and additional material on analysis of synthetic peptides and peptidomimetics, as well as synthetic methods for novel amino acids used in peptide synthesis. The various chapters are not encyclopedic, but rather they provide examples of effective methodologies. Following in the Houben−Weyl tradition, actual synthetic methods are provided and extensive references are made to the pertinent literature. This volume brings together contributions from many of the leading practitioners of peptide, peptidomimetic, and protein synthesis worldwide, and it represents a fairly accurate, up-to-date picture of the organic chemistry of peptides and peptidomimetics as viewed by these contributors.

The volume begins with an introduction by F. Naider and M. Goodman, outlining the intended scope of the volumes and a brief history of peptide synthesis covering some of the highlights of 20th century peptide synthesis. This is followed by a lucid discussion by L. Moroder of the general concepts used in peptide synthesis. All of the topics discussed in these introductory chapters are covered in greater detail throughout the remainder of the volume, and many other aspects not discussed also are covered. Often it is convenient to distinguish between strategies and tactics in discussing peptide synthesis. Aspects of both are seen in this first volume, with emphasis on the specific tactics that are used in peptide synthesis.

The first specific chapter covers the protection of amino groups. It starts with an extensive discussion of α-amino protecting groups. In the organic synthesis of peptides, the temporary protection of this group is central to any synthetic strategy. All of the major protecting groups (Cbz, *t*-Boc, Fmoc, Trt, etc.) are covered, as well as several that have more specific or selective applications. Equally important are careful considerations of the methods for quantitative cleavage of these temporary N^{α}-protecting groups. This is followed by a discussion of the protection of side chain amino groups in the presence of α-amino group protection. Methods that provide orthogonal protection to ϵ-amino groups during synthetic assembly of a complex polypeptide are emphasized.

A chapter on the protection of the α-carboxyl groups follows, and this is followed by methods used to protect ω-carboxyl groups. Again, methods for quantitative cleavage of these protecting groups are given, and utilization of differential protection is discussed. Chapter 3 deals in detail with peptide bond-forming reactions including azides, active esters, acid halides and anhydrides, carbodiimides, phosphonium salts, and uronium/guanidinium salts. All of these methods find wide use in peptide synthesis, and many useful specific methods and discussions are provided that will be of benefit to both the novice and the experienced synthetic chemist.

Chapter 4 on peptide synthesis covers 300 pages, and it deals with all aspects of peptide synthesis, including solution- and solid-phase synthesis (the bulk of the discussion), chemical ligation (too briefly), enzymatic synthesis, and combinatorial synthesis. Numerous specific syntheses are provided, and thoughtful discussions of some problems that can be encountered are given. There is some inevitable overlap, given the numerous authors that have contributed, but there is much that is useful for any person who wishes to synthesize a peptide.

As a practitioner of peptide synthesis for over 37 years, I never cease to marvel at the extraordinary accomplishments of peptide, peptidomimetic, and protein synthetic methodology over the past century. The scope of synthetic methodology and the ability to incorporate virtually all synthetic chemistry into peptide and protein synthesis are truly inspiring. Furthermore, the ability to make millions of spatially addressable peptides and peptidomimetics in a few days, to assemble quickly large proteins from polypeptide segments, or to prepare highly complex cyclic or multicyclic peptides and peptidomimetics continues to amaze and inspire. In this first volume, you will find many synthetic gems that you can bring to your own practice of peptide or peptidomimetic chemistry, whether you are new to the field or an old-timer. This is a volume that you will want to explore; once you start you will have trouble putting it down. I eagerly await the next three volumes.

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