Book Reviews*

Spin Labeling: Theory and Applications. Biological Magnetic Resonance. Volume 8. Edited by L. J. Berliner (Ohio State University) and J. Reuben (Hercules Incorporated). Plenum: New York and London. 1989. xix + 650 pp + 1 PC diskette. $95.00. ISBN 0-306-43072-X.

The remarkable versatility of nitroxide-free radicals and their EPR spectra is demonstrated anew in a third volume of *Spin Labeling: Theory and Applications*. This volume appears 13 years after Volume I and 10 years after Volume II. It is part of the series on *Biological Magnetic Resonance* and is technically Volume 8 of that series. In the new volume, the reader will find that theoretical treatments of nitroxide line shapes for samples in a variety of instrumental and diffusional conditions has matured (a diskette with software by D. Schneider and J. Freed for rapid calculation of slow-motional magnetic resonance spectra is supplied with the book). Readers will learn also that applications of spin labels have expanded into related disciplines including studies of chemical models of metal-free radical interactions, characterization of other free radicals that are less stable than nitroxides, and identification by NMR difference spectroscopy of the amino acid side chains of an antibody that are in contact with a spin-label hapten. Some parts of the book update and expand work presented in Volumes I and II, and other parts present detailed coverage of new developments. Therefore, the volume stands alone and will be of much interest to those seeking a thorough coverage of spin labeling to date. The book would provide an excellent background for a graduate course in magnetic resonance. It should certainly be read by students beginning research work in electron paramagnetic resonance.

My choice of title for some of the chapters would have been different, and I will describe how I would use the book to introduce students to EPR. The chapter by Hemminga and de Jager is a good place to start. It reviews Bloch equations and basic spectrometer design and gives a clear discussion, with illustrations, of why spin labels are so effective in revealing dynamic processes occurring in nanoseconds to milliseconds. The theoretical simulation of the effects of slow and very slow rotational motion on EPR spectra is given in-depth coverage by Schneider and Freed and by Beth and Robinson. The Schneider and Freed chapter gives, as announced in the title, a user's guide to calculations with a thorough description of algorithms that make rapid calculation possible. The Beth and Robinson chapter presents the theory of EPR saturation transfer clearly and gives many examples that demonstrate how precise the simulations of the effects of dynamics have become. It points to the future in giving the theory of saturation recovery which, as pulsed EPR methods are developed, should permit mapping the trajectory of a point on a macromolecule as the molecule tumbles. The simulations require accurate data on magnetic parameters. Bales gives a detailed discussion of the contribution of proton-coupling constants to nitroxide line widths, and Hyde and Feix give electron T_1's in discussing how ELDOR can provide information about molecular motion. The chapter by Marsh is particularly good in pointing out the ways that spectra can be analyzed without full simulation, but also provides a good theoretical background for the approximations. The theory and results of the case of rapid exchange of a lipid spin label between membrane sites on an off a protein is given also. The spin–spin interactions of two paramagnetic centers are important in several chapters, for instance, Hyde and Subczynski show how spin labels may be used to measure oxygen concentrations in solution and oxygen diffusion rates. The full theory of spin–spin interactions is presented by Eaton and Eaton. In addition, they give examples of cases from their own work and others of a spin 1/2 particle interacting with a paramagnetic metal. These examples should be of considerable interest to bioinorganic chemists. The stability of nitroxides is used in the spin–trapping method to convert labile free radicals into nitroxides that yield information about the original radical. Mottley and Mason give very complete coverage to spin–trapping and provide a clear discussion of some past misassignments. Protein chemists will find the remaining chapters of much interest. Park and Trommer describe a novel category of interactions between spin-label cofactors in tetrameric enzymes: dipole interactions between cofactors on neighboring subunits give new EPR line shapes that allow cooperativity to be assessed. They also give applications to macromolecular interactions. Anglister reviews his work to simplify the NMR spectra of antibody Fab fragments by taking difference spectra when one member of the pair contains a spin-labeled hapten. The spin label is no perturbation here! One could imagine extending this work to catalytic antibodies. The present and future accomplishments with spin labels owe much to the design and synthesis of appropriate structures. Hideg and Hankovszky give synthetic procedures for spin-labeled amino acids. The yields are excellent and the structures should provide inspiration for future applications to protein chemistry. Isotopically substituted spin labels are mentioned in practically every chapter of the book and in three titles. A chapter on synthesis of this very important category of spin level is given by Park and Trommer.

Will there be a fourth volume of *Spin Labeling: Theory and Applications*? Most certainly yes and probably within a few years. Rapid developments in pulsed EPR instrumentation are taking place and new applications to dynamics and relaxation will result. Spin-label applications to DNA dynamics are now on a firm theoretical footing. Spin-label contrast agents for NMR imaging contribute to the need for a theory of relaxation. A theory of spin-trapped spectra would also be welcome. Spin-label applications in nonbiological areas might be reviewed also.

Betty Jean Gaffney, *The Johns Hopkins University*

Pharmaceutical Dosage Forms. Volume 2: Disperse Systems. Edited by H. A. Lieberman, M. M. Reiger, and G. S. Banker (H. H. Liberman Associates, Inc.). Marcel Dekker: New York and Basel. 1989. xx + 690 pp. $125.00. ISBN 0-8247-8104-X.

The second volume of *Disperse Systems* completes the seven-volume series entitled *Pharmaceutical Dosage Forms*. The collection comprises, in addition to the two volumes on disperse systems, three volumes on tablets and two volumes on parenterals.

While Volume I of *Disperse Systems* attempted to provide the reader with the basic concepts underlying this type of dosage form, the second volume is geared more toward direct applicability and problem solving. As a teaching tool at the undergraduate level, therefore (i.e., for professional pharmacy curricula), this book is less generally useful than the first volume. For the technologist in industry, however, the text represents a valuable resource, with plenty of useful tips and insights.

The editors have assembled a high-quality group of contributors, drawing upon expertise in both academia and industry. Of course, as with all multi-authored works, the chapters vary in absolute worth. Some tend to be extended lists of recipes, others strive for, and achieve, a better balance of analysis and practicality. For example, Schoenwald and Flanagan do a nice job with the difficult task of summarizing the issues pertaining to the bioavailability of drugs delivered from disperse dosage forms. The chapters on liposomes by Riaz et al. and on ophthalmic ointments and suspensions by Bapatla and Heck are also well done.

Most of the chapters fall into the 30–40-page range, and this length is, on the whole, appropriate. However, the opening effort on equipment selection and operation (70 pages) seems a little excessive. Equally, is a 30+-page article on suppositories justified at this time? Or 20 pages on toothpaste? Conversely, the chapter on gels was surprisingly short. The organization of the book is somewhat haphazard and awkward. For example, the chapter on liposomes is sandwiched between those on suppositories and drug regulatory affairs and is found some 200 pages after the chapter on emulsions and microemulsions. Other mildly irritating features are a relatively brief index and an inconsistent referencing style in the different chapters. It does not seem unreasonable to expect uniformity in the latter for a multiple-contributor text such as this.

Nevertheless, most pharmaceutical technology laboratories will probably want to have this volume and its six "cousins" available for handy consultation. Despite some organizational weaknesses as specified above, the majority of readers are likely to find information of value sprinkled among the pages of this book.

Richard H. Guy, *University of California, San Francisco*

Computerized Multiple Input Chromatography. By M. Kaljurand and E. Küllik (Institute of Chemistry, Estonia Academy of Sciences). John Wiley & Sons: New York. 1989. 225 pp. $105.00. ISBN 0470-21228-4.

This book deals with applications of chromatography that require multiple injections. The two main topics covered are multiplex (or correlation) chromatography and multidimensional chromatography.

The first two chapters mainly describe multiplex chromatography. Unlike conventional chromatography, in this technique, a series of injections are made in rapid sucession, resulting in an overlap or convolution of peaks at the detector. Then the chromatogram is reconstructed using cross-correlation or Fourier transformation. Although multiplex chromatography is an interesting technique with potential advantages in GC, LC, and SFC, it is not very well known. This is the first published

*Unsigned book reviews are by the Book Review Editor.

book that has described this technique in detail. The third chapter is devoted to multidimensional chromatography, and the fourth chapter discusses instrumentation with emphasis on sample introduction. In the last chapter, some of the applications of these techniques are mentioned. There are also appendix sections which contain additional details on Hadamard transform and computer programs for multiplex chromatography.

The mathematical and theoretical aspects of multiplex and multidimensional chromatography have been presented quite well and in sufficient detail. Adequate references are also to be found at the end of each chapter; however, the literature cited is not past the year 1986. The application section is probably the weakest part of the book. It focuses mainly on polymer characterization with few examples of multiplex and multidimensional chromatography. Additional examples of applications such as process stream analysis and head-space analysis would have broadened the book's appeal.

In summary, most analytical chemists will find this book very interesting as it explores some unconventional ways of doing chromatography. It is also a valuable reference book for those who want to use chromatography for reaction or process stream analysis. If not every chromatographer, every library should have this book.

Somenath Mitra, *U.S. EPA*

Selective Sample Handling and Detection in High-Performance Liquid Chromatography: Part B. Journal of Chromatography Library Volume 39B. By K. Zech (Byk Gulden Pharmaceuticals) and R. W. Frei (Free University, Amsterdam). Elsevier: Amsterdam and New York. 1989. xi + 394 pp. $129.25. ISBN 0-444-88327-2.

This book is the second volume of a two-part series which attempts to treat both sample handling and detection in an integrated manner. There is no doubt that optimization of sample preparation or pretreatment and/or detection can drastically reduce the separation requirements of the column in HPLC. Both this volume and Part A provide several different approaches to both sample handling and detection.

Chapter I discusses preconcentration and chromatography on chemically modified silicas with complexation properties. Included in this chapter is a description of some of the chemical modification processes for silica. Chapter II deals with sample handling in ion chromatography. A wide variety of sample types and approaches for ion chromatography are discussed. Chapter III treats some aspects of sample preparation for whole blood analysis by chromatography. Extensive tables provide concise information on liquid–liquid extraction of blood samples and HPLC procedures for the quantitative determination of cyclosporine. Chapter IV focuses on radiocolumn chromatography, the separation of radiolabeled compounds. Both detection and counting principles are discussed in some detail. Chapter V is a review of postcolumn reaction detection techniques for HPLC. It gives several representative diagrams and descriptions of postcolumn reactors as well numerous applications to detection of biomolecules. Chapter VI covers the subject of luminescence detection techniques. The main emphasis is on detection via phosphorescence and chemiluminescence. The last chapter, VII, discusses continuous separation techniques in flow-injection analysis. This chapter presents diagrams for a large variety of FIA experimental apparatus which will be useful to the reader who is unfamiliar with the technique.

It will be necessary to have both parts of this series for the reader to have any perspective on the variety of sample preparation techniques and selective detection methods which are available in HPLC. However it should not be thought of as an exhaustive treatment of the subject since not all complex sample types or selective detection methods can be discussed. It is not clear why FIA is included within this series. While FIA has some characteristics of chromatography, it is a topic that should be discussed in more detail elsewhere. In general, there are adequate references in all the chapters so the reader can pursue a particular topic in more detail.

Joseph J. Pesek, *San Jose State University*

Glutathione. Chemical, Biochemical, and Medical Aspects. Parts A and B. Coenzymes and Cofactors Volume III. Edited by David Dolphin (University of British Columbia), Rozanne Poulson (University of Victoria), and Olga Avramović (University of British Columbia). John Wiley & Sons: New York and Chichester. 1989. Part A: xiv + 930 pp. $125.00. ISBN 0-471-09784-5. Part B: xiv + 930 pp. $125.00. ISBN 0-471-09784-5.

This pair of volumes constitutes Volume III of a series on Coenzymes and Cofactors and is composed of 38 contributed chapters. Each of the two parts is paginated and indexed separately, and each includes a true author index. The magnitude of this aspect can be appreciated when one notes that some of the chapters have over 400 reference citations.

The year 1988 was the centennial of the isolation of glutathione from yeast by J. de Rey-Pailhade: the structure was not elucidated until 1929, and synthesis was accomplished in 1935. Since then, the biological, pharmacological, and biochemical importance of glutathione as a coenzyme has grown enormously, and it is appropriate and useful to have all aspects—chemical, biochemical, medicinal, and nutritional—brought together in one work.

Part A starts with an extensive historical essay, and then treats physical and chemical properties, including synthesis and determination, along with most of the biochemistry. Part B is more medical and pharmacological, and treats metabolism in multifarious aspects. The two parts constitute a major and comprehensive reference work.

Pesticide Chemistry. Studies in Environmental Science 32. By Gy. Matolcsy, M. Nádasy, and V. Andriska. Elsevier: Amsterdam and New York. 1988. 800 pp. $260.60. ISBN 0-444-98903-X.

The authors state that this is not intended to be an encyclopedic work, but is a collection of discussions on substances considered to be of practical significance, to have future importance, or to represent interesting trends. The six chapters have the titles: Anti-Insect Agents, Ascaricides, Nematocides, Rodenticides, Fungicides, and Herbicides. Within each, the substances are arranged according to structural type. Natural occurrence (if any), synthesis, chemical structure, applications, and mode of action, but not analysis, are discussed. The bibliographies are extensive and include books, journals, patents, and abstracts of meetings. A subject index of 22 pages augments the detailed table of contents.

Organic Syntheses. Volume 67. Edited by Bruce E. Smart. John Wiley & Sons: New York and Chichester. 1989. xix + 289 pp. $34.95. ISBN 0-471-51379-2.

This volume opens with a memorial to the late Carl S. Marvel, who was intimately involved with *Organic Syntheses* from its founding.

Thirty preparative procedures, each checked experimentally in the laboratory of a member of the Board of Editors, make up this volume. As is customary in the series, some preparations are chosen because they represent new, general synthetic methods, and others because of the interest in a specific compound. Preparations of chiral compounds are particularly well represented, as are examples of the use of organometallic reagents. The latter include compounds of cobalt, nickel, aluminum, titanium rhodium, palladium, tin, zinc, and copper.

Unlike the soft-bound edition distributed gratis to members of the organic divisions of societies in France, Japan, USA, and the UK, the hard-bound edition contains indexes, including a cumulative subject index for Volumes 65, 66, and 67.

Dictionary of Biochemistry and Molecular Biology. Second Edition. By J. Stenesh (Western Michigan University). John Wiley & Sons: New York and Chichester. 1989. vii + 525 pp. $59.95. ISBN 0-471-84089-0.

This edition is revised and enlarged from the 1975 first edition, and some 4000 new terms have been added. The definitions are succinct, clear, and precise, and evidently carefully considered. Some of them have been expanded, compared to the first edition. Many more specific compounds are defined. Large numbers of terms from organic chemistry are included; among them are some, such as "synthon", which are not often found in dictionaries. A commendably large representation of recent terms is to be found. Definitions of compounds or classes are overwhelmingly in the form of words (occasionally circumlocutions) or systematic names (IUPAC), and structural formulas are rarely shown. This may be the principal shortcoming of this dictionary for some users (e.g., pyruvic acid is defined as "The three-carbon ketoacid that is the end product of glycolysis under aerobic conditions"). Many acronyms and abbreviations for groups or structural units are defined. Biological and physiological terms are, of course, a major part of the content. Processes, apparatus, procedures, and theories are well represented, whether they are known by proper names or descriptive phases (e.g., Wilzbach method; wandering-spot procedure; Wilson chamber; Prausnitz–Kuestner reaction).

Advances in Soil Science. Volume 11. Soil Degradation. Edited by R. Lal (Ohio State University) and B. A. Stewart (USDA). Springer-Verlag: New York. 1990. xvii + 336 pp. $98.00. ISBN 0-387-97126-2.

Volume 11 of this series discusses soil degradation, which is defined by the editors as "a decline in soil quality caused through its misuse by humans". It focuses on the diminution of the productivity of soils on a worldwide scale due primarily to adverse changes in physical and biological properties, and concentrations of nutrients, electrolytes and toxic substances. The volume consists of eight well-written chapters by guest authors and an excellent preface and closing by the editors.

The individual chapters highlight eight major issues that relate to the worldwide degrading of soils. The first five chapters deal with processes

involved in the physical degradation of soil, including soil compaction, hardsetting, the role of plinthite, soil erosion, and excessive soil wetness leading to anaerobiosis. The next two chapters deal with chemical degradation of soils, while the final chapter deals with microbial degradation. Each chapter is an in-depth view, containing thorough reviews of the current literature, helpful definitions for the uninitiated, thorough descriptions of processes and problems, and discussions of possible alternatives and suggestions for restoration.

This book is really much more than a collection of papers on soil degradation. It is a well-integrated review of current problems and possible solutions to soil degradation processes. It will be useful, not only to soil scientists, but to anyone involved in the management of natural resources. In addition, because of its organization and in-depth reviews, it would make an excellent text for a graduate course on soil management or degradation.

Mary Sohn, *Florida Institute of Technology*

Advances in Soil Science. Volume 12. Edited by B. A. Stewart (USDA). Springer-Verlag: New York. 1989. viii + 216 pp. $85.00. ISBN 0-387-97121-1.

Volume 12 of the Advances in Soil Science Series is itself titled *Advances in Soil Science* and consists of five chapters. Although each chapter is well written, the volume has no central theme or focal point, other than that all the chapters deal with soil science.

Chapter 1 deals with soil structure and its rate of change under various agricultural practices, while Chapter 2 reviews what is currently known about the interaction between the nitrogen-fixing bacterium *Azospirillum* with crop roots. Chapters 3 and 4 discuss applications of ^{57}Fe Mössbauer spectroscopy and high-resolution transmission electron microscopy (HRTEM) to the study of clays and soils, while the final chapter discusses the relationships between bare-soil evaporation and tillage.

Each chapter is a well-written, cohesive unit in which basic principles are clearly discussed and terminology is well defined. In addition, the authors present specific suggestions about agricultural applications. This volume will prove most useful to soil scientists with specific interests in the chapters described above.

Mary Sohn, *Florida Institute of Technology*

Theilheimer's Synthetic Methods of Organic Chemistry. Volume 43. Edited by A. F. Finch. S. Karger: Basel. 1989. xxii + 506 pp. $465.00. ISBN 3-8055-4896-6.

This 1989 yearbook covers papers published in 1987 and early 1988. The pattern and detail of coverage keep to the successful precedent of the earlier volumes of the series: brief experimental descriptions and equations with structural formulas, all arranged in a highly systematic way.

One of the features of every volume is a short essay, Trends in Synthetic Organic Chemistry. Although it is only 5 pages long in this volume, it is packed with information, and it serves to bridge the gap between the formal, systematic coverage and the date of printing of the book. Thus, it is devoted largely to the literatue of 1989 and late 1988. Another consistent feature of the series is the index, which is extraordinarily thorough and provides an alternative means of access for those who do not want to learn the systematic organization of the data in this book.

As has been noted in reviews of previous volumes, this series is expensive. However, one is paying for a service, an enormous amount of work in searching, compiling, and organizing. It should save much more in the valuable time of a research chemist than the cost of the volumes to the institutional or company library. And although it is essentially a reference work, a key to the literature, it is also interesting and instructive simply to browse in it.

Chemistry & Physics of DNA–Ligand Interactions. Edited by Neville R. Kallenbach (New York University). Adenine Press: Schenectady, NY. 1990. vii + 212 pp. $65.00. ISBN 0-940030-25-X.

The initial goal of this book was to review progress in the field of drug–DNA interactions, in order to commemorate the untimely death of Edmond Gabby in 1979. The subsequent aim was to provide researchers and graduate students an overview and examples of physicochemical and theoretical methods for investigating the complexes of DNA with drugs and DNA dynamics in solution.

The book contains 6 chapters contributed by different authors. The topics covered include interactions of anthracycline with DNA; theoretical assessment of the effect of polyelectrolyte contribution to drug–DNA binding curves: theories dealing with helix formation and ligand intercalation; recent advances in NMR analysis of drug–DNA interactions: and application and quantitative analysis of various footprinting methods. The last chapter provides an overview of Professor Gabbay's work and his contributions to the field of DNA structure and ligand–DNA interactions.

Minou Bina, *Purdue University*

Catalysis. Volume 8. A Review of Recent Literature. Edited by G. C. Bond (Brunel University) and G. Webb (University of Glasgow). Royal Society of Chemistry: Cambridge. 1989. 203 pp. $134.00. ISBN 0-85186-594-1.

This book is a collection of five reviews on catalysis that cover different areas in this broad and diverse field. The first chapter discusses recent applications of Extended X-Ray Absorption Spectroscopy to catalyst surface studies. This well-written and critical review closes with interesting comments about future directions. The second chapter contains a fascinating discussion on the application of computational chemistry to heterogeneous catalysis. Much of the discussion centers around chemisorption on catalyst surfaces. The third chapter also is concerned with theoretical studies but is restricted to the important subject of zeolites. In the fourth chapter, many examples of heterogeneous acid and base catalysis are cataloged. The final chapter discusses catalytic (metal and metal oxide) oxidation of volatile organic mixtures. While the first three chapters may be of the greatest general use, these reviews should serve as an introduction to those interested in expanding their knowledge of heterogeneous catalysis. Unfortunately, as the editors have observed, author delays have yielded reviews a bit out of date with few recent (after 1987) references.

J. A. Deyrup, *University of Florida*

Chromatography and Modification of Nucleosides. Part A: Analytical Methods For Major and Modified Nucleosides—HPLC, GC, MS, NMR, UV and FT-IR. Edited by C. W. Gehrke and K. C. T. Kuo (University of Missouri—Columbia). Elsevier: Amsterdam and New York. 1990. liii + 400 pp. $141.00. ISBN 0-444-88540-4.

This book, part of the *Journal of Chromatography Library* series, is the first of four volumes dealing with recent advances in research on the preparation, isolation, analysis, and biological roles of modified nucleosides. The focus of this volume is on advanced methods for the separation and analysis of t-RNA's, mRNA's, mtRNA's, rRNA's, and DNA's.

The book consists of ten separate chapters, each written by different contributors who are recognized experts in their fields. The editors themselves are co-authors of three chapters. The introductory pages contain nearly 50 pages of biographical information on the contributors. It is not clear why the editors felt that it was necessary to include this much biographical data. The qualifications of most of the contributors are well-known to researchers working in the area of modified nucleosides, which is obviously the targeted audience for the book.

As the title implies, most of the chapters of the book deal with chromatographic methods, including reversed-phase, affinity, and hydrophobic interaction chromatography. These chapters encompass a very useful, comprehensive, and up-to-date discussion of liquid chromatographic methods for the separation and analysis of modified nucleosides. Each chapter contains more experimental details than are usually found in standard research papers, and thus the methods discussed should be able to be easily adapted by other researchers. References are comprehensive and current.

A few chapters deal with studies using nonchromatographic techniques for analysis of modified nucleosides, such as NMR spectroscopy and temperature-jump relaxation techniques. While these chapters are as comprehensive and well-written as the others, they seem to be inappropriate for this volume and probably should have been published elsewhere.

Despite the overly long biographical data and the loss of focus caused by inclusion of some inappropriate topics, this monograph is a timely reference book for molecular biologists, biochemists, and analytical chemists working in the area of modified nucleosides.

Jerome E. Haky, *Florida Atlantic University*