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Book Reviews

Applications of High Performance Liquid Chromatography.

By A. Pryde and M. T. Gilbert. Halsted Press (Wiley), New York. 1979. xii + 255 pp. 16 × 24 cm. \$29.95.

As the field of high-performance LC has broadened and diversified in its applicability to research problems, it has evolved from a subdiscipline populated by analytical chemists to a powerful research tool applicable to a variety of problems. Of particular significance is that its use profile has changed dramatically in the last 3 or 4 years. Formerly, LC was promoted as a method complimentary to GC and TLC, one that would allow the investigation of nonvolatile or thermally labile substances not suitable for the more commonly used methods. Recently, LC analysis has become a viable and highly competitive alternative to the other methods that also accomplish the analysis satisfactorily. Needless to say, this change is of remarkable consequence to the practicing scientist, and its importance is in part reflected by the recent increase in the number of instrument manufacturers offering LC hardware. Also reflecting this "coming of age" is the increase in the number of texts and monographs devoted to the subject of high-performance LC.

The present work seems to represent an extension of an earlier book, "Introduction to High Performance Liquid Chromatography", by Hamilton and Sewell, reviewed in the July, 1979, issue of this journal. Both the former work and the one considered here are published in Europe by Chapman and Hall (London), and both seem to be products of a consistent editorial direction. The current book has an obviously more applied orientation, as reflected in the title.

The book is divided into five major parts, four of which are concerned exclusively with applications. The first part, entitled "Theory and Practice of HPLC", uses most of its 53 pages to describe the equipment and modes used in chromatography, as well as several practical tips on how to accomplish an analysis. Only 7 pages are devoted to theory per se, and those consist mostly of definitions of parameters. The remaining sections are devoted to "Pharmaceutical Analysis", "Biochemical Analysis", "Environmental Analysis", and "Miscellaneous Applications", in that order. In the section on "Pharmaceutical Analysis" (54 pages), coverage is devoted to several major classes of drugs and chemotherapeutic agents, and when possible separate discussions occur for the analysis of dosage forms and the analysis of metabolites and biologic fluid. The "Biochemical Analysis" section (59 pages) essentially covers analysis of endogenous materials, with chapters on lipids, steroids, carbohydrates, biogenic amines and proteins, nucleotides and related substances, vitamins, and

several other categories. Obviously, to cover such a wide range of applications in the space provided, detail is somewhat limited, but this is not a deficiency due to the copious use of references. The "Environmental Analysis" section (20 pages) consists of one chapter devoted to pesticides, carcinogens, and industrial pollutants, with most of the examples and discussion focusing on the first two. In the "Miscellaneous Applications" section (12 pages), topics such as plant products, food products, inorganic analysis, and optical resolution receive very brief coverage.

As mentioned above, the book makes extensive use of references, with some 876 included through Spring, 1977. Considering the monumental task of compiling and organizing the material, the authors are to be commended for the creation of a work that will be useful to both neophytes and established researchers. Inexperienced users will find guidance both on how to begin and on the types of separations reported by others, while experienced users will find the work a useful literature review for reference. The only shortcoming of the book is that it is a victim of the very characteristic that has made the field so impressive—the rapidity of its development. In this regard, it is not up to date, but it is probably impossible to produce a hard-cover, fully typeset, and illustrated book such as this one in much shorter time. With this fact in mind, it is a book worthy of inclusion in the libraries of those who are working in, or hope to be working in, the area of high-performance LC.

University of Connecticut

James G. Henkel

Biological/Biomedical Applications of Liquid Chromatography.

Edited by Gerald L. Hawk. Marcel Dekker, New York. 1979. xv + 736 pp. 15.5 × 23.5 cm. Swiss francs 106.00.

This book contains the contributions of 36 groups who presented papers at the First Liquid Chromatography Symposium, held in Oct 1977 under the auspices of the Waters Co. With such a wide group of contributions, it is not unexpected that the quality of the various papers varied from excellent to mediocre. Topics covered included applications of high-performance LC to prostaglandin analysis, the analysis of proteins and peptides, nucleotides, pteridines, cancer chemotherapy, and antibiotics. The drawbacks of this book are (1) it was to some extent, although not exclusively, restricted to the use of Waters instrumentation; (2) readers will seek in vain for advances in the state of the art. The papers were presented essentially from the viewpoint of individuals using state-of-the-art instrumentation of the 1974 to

1976 vintage. Improvements, particularly in column packings, may already have rendered some of the paper obsolete. Nevertheless, the papers will be very helpful to workers who are utilizing high-performance LC in biomedical and biological applications, and it should be of particular usefulness to individuals who have need for a rapid introduction to the broad range of topics covered. Unfortunately, the odds are that in the next 5 years methods of increased sensitivity and newer applications of high-performance LC, such as combined high-performance LC-mass spectrometry, will be coming forth at such a rapid rate that this particular book may be obsolete. Moreover, this series of volumes in Chromatographic Science already includes Volume 6, "High Speed Liquid Chromatography"; Volume 8, "Liquid Chromatography of Polymers and Related Materials"; and Volume 9, "GLC and HPLC Determination of Therapeutic Agents". There is apt to be a considerable overlap in some of these areas. There is very little doubt that the book should appear in the various broad libraries of institutions and companies. The reviewer is dubious whether he can recommend this book to individual readers.

Research Triangle Institute

Monroe E. Wall

Microtubules. By Pierre Dustin. Springer-Verlag, Berlin, Heidelberg, and New York. 1978. xiv + 452 pp. 17 × 25 cm. \$74.00.

This book is a review of the extensive literature on microtubules published over the 10 years preceding 1976, with some references in 1977. It is a coherent, well-written summary which both the novice and the professional will enjoy. The author points out in the Introduction that the study of microtubules is closely linked to that of a few drugs which are known to combine specifically to some sites of their constitutive molecules. He is careful to present precisely what is known about both the molecules and the drugs. The medicinal chemist will especially appreciate his care to describe the limitations on interpretation of experimental results imposed by the use of the various drugs.

After a presentation of historical background in Chapter 1, the author describes the biochemistry of microtubules in Chapter 2 and the general physiology of tubulins and microtubules in Chapter 3. He continues by describing the cellular structures which contain microtubules, such as centrioles, basal bodies, cilia, and axonemes, in Chapter 4. An excellent chapter on microtubule poisons (drugs that alter microtubules), including hard-to-find chemical formulas, is followed by several chapters on cellular processes that involve microtubules in one form or another. The involvement of microtubules and their poisons in pathology and medicine precedes the final chapter, which includes predictions for future avenues of research.

The field of contractile elements in animal cells involves microfilaments and intermediate filaments, as well as microtubules. The pace of research, especially regarding intermediate filaments, is hectic. To fully understand mitosis and cell movement, the interested researcher or student must read widely on all three aspects. This book provides an excellent starting place.

Northeastern University

Phyllis R. Strauss

Essays in Biochemistry. Volume 14. Edited by P. N. Campbell and W. N. Aldridge. Academic Press, London, New York, and San Francisco. 1978. 128 pp. 15.1 × 23 cm. \$8.75.

The three essays in this volume are: "Microvilli: Their Ultrastructure, Enzymology and Molecular Organization" (by A. J. Kenny and A. G. Booth), "The Neurosecretory Neurone: A Model System for the Study of Secretion" (by B. T. Pickering), and "The Control of the Metabolism and the Hormonal Role of Adenosine" (by J. R. S. Arch and E. A. Newsholme). Each essay is stimulating, well referenced, and readable. Of greatest interest to medicinal chemists in terms of guidance for analogue design are the extensive coverage of the secretion of posterior pituitary hormones and their relationship to neurophysin and the review

on adenosine, which discusses the important effects of adenosine on cyclic nucleotides, platelet aggregation, lipolysis, and muscle tone.

Tufts University

Roy L. Kisliuk

The Chemistry of Heterocyclic Compounds. Volume 34. Thiazole and Its Derivatives. Part 1. Edited by Jacques V. Metzger. Wiley-Interscience, New York. 1979. xiv + 612 pp. 16 × 23.5 cm. \$80.00.

This volume is the first part of a three-part set devoted to the chemistry of the thiazole ring and Volume 34 of the series "The Chemistry of Heterocyclic Compounds". It is the first monograph on the subject to appear since Sprague and Land's chapter in Volume 5 of Elderfield's series on "Heterocyclic Compounds". Part 1, under consideration here, is devoted to various physical and chemical aspects of thiazole and to some of its monocyclic derivatives.

Chapter 1 (by J. V. Metzger, E.-J. Vincent, J. Chouteau, and G. Mille) reviews the rather entertaining history of thiazoles, their spectroscopic and other physical properties, and some of their reactions. Chapter 2 (by G. Vernin) discusses various synthetic methods for the assembly of the thiazole ring and thiazolium salts. Chapter 3 (by J. P. Aune, H. J.-M. Dou, and J. Crousier) describes various chemical aspects of alkyl, aryl, aralkyl, and related thiazole derivatives. The next chapter (by R. Meyer) is devoted to the chemistry of thiazolecarboxylic acids, thiazolecarboxaldehydes, and thiazolyl ketones. Chapter 5 (by L. Forlani and P. E. Todesco) is concentrated on halo- and nitrothiazoles.

The project, under the editorship of Professor Metzger, is virtually an all-French production, the editor straying only as far as Italy for some foreign contributors. The somewhat overly strong French flavor of the book is apparent in some of the chapters from the non-English syntax and usage of words such as univoque, acetone, chlorohydrate, thiohydantoine, ClH, NO₂H, AlLiH₄, IK, Cl₂Sn, etc. However, this reviewer places the blame for these occasional gallicisms on the inattentive Wiley-Interscience copy editor rather than on the authors. More disturbing, however, is the unacceptably large number of references to graduate theses submitted during 1960-1975 to the University of Marseille. These works are of very limited value as source material inasmuch as they are not readily accessible to the international chemical community. An unusual feature of Chapters 2 and 3 is the labeling of single structural formulas with both structure numbers and scheme numbers.

On the positive side, a serious effort has been made in each chapter to cover the particular subject matter comprehensively and to include extensive tables giving some physical properties and references to the preparation of various thiazoles. The literature has been surveyed to December 1976 and there are sufficient references to papers appearing in the 1970's to suggest that it is as up to date as can be expected. For the chemist involved in heterocyclic chemistry, especially that of the thiazole ring, this volume can be recommended despite its minor shortcomings. Certainly it is a welcome addition to "The Chemistry of Heterocyclic Compounds" series.

Walter Reed Army Institute of Research

Daniel L. Klayman

Immobilized Enzymes. Research and Development. Edited by Ichiro Chibata. Halsted Press, New York. 1978. viii + 284 pp. 23 × 15.5 cm. \$35.00.

In recent years, the technology has been developed by which enzymes and microbial cells can be immobilized and their catalytic capabilities utilized for analytical, medical, or synthetic purposes. This book attempts to provide the reader with a comprehensive treatise on immobilization technology, including topics such as the methodology used for immobilization, the properties of these immobilized systems, and the possible practical applications of these systems.

Chapter 1 of the book deals primarily with the historical development of the field and an introduction to the nomenclature. In Chapter 2, the authors describe the various methods available

for immobilization of enzymes, coenzymes, and microbial cells. This chapter provides a general discussion of these techniques, as well as many specific examples. Chapter 3 deals with the changes which occur in the properties of enzymes or microbial cells upon immobilization. Specific examples of changes in substrate specificity, pH optimum, temperature optimum, and kinetic constants for immobilized enzymes are cited. An excellent discussion is provided in this chapter concerning the stability of these immobilized systems to proteolysis, heat, storage, and operation conditions. All of these factors are important in the practical implementation of these techniques. Chapter 4, which is the most interesting and informative chapter, deals with how these immobilized systems are used in analytical chemistry, medicine, food processing, waste treatment, and energy production. The examples cited provide a good insight into the tremendous potential of this technique.

The book is well organized, well referenced, and very comprehensive. It would be an excellent reference text for chemical engineers, organic chemists, or biochemists working in the field. In addition, the book might also be recommended as an introduction to the field or as a means of updating one's knowledge on enzyme immobilization.

University of Kansas

Ronald T. Borchardt

Cannabinoid Analysis in Physiological Fluids. ACS Symposium Series No. 98. By Joe A. Vinson. American Chemical Society, Washington D.C. 1979. ix + 242 pp. 16 × 23 cm. \$25.00.

In March, the National Cancer Institute held a meeting to discuss the current status of antiemetic research for the control of cancer chemotherapy. The major topic of discussion was the role of the cannabinoids in this area. One study in particular classified subjects according to their response to a given dose of Δ^9 -THC. Analysis of blood samples showed a direct relationship between response and blood levels of THC, indicating that lack of response or poor response was largely due to absorption of the material. This work underscores the necessity for pharmacokinetic studies in the assessment of the total clinical picture for new drugs. With the advent of cannabinoid drugs for potential use in the areas of glaucoma and cancer chemotherapy induced emesis, this book comes as a timely addition to the bibliography on cannabinoids. In Chapter 2 many of the pitfalls associated with the

analysis of cannabinoid drugs are discussed, together with solutions for overcoming them.

Techniques such as mass fragmentography and high-performance liquid chromatography are now widely available, and the book describes in detail the work of a number of laboratories on this subject. Analysis of cannabinoids and their metabolites in blood plasma, urine, and breast milk is described using these techniques, although in some instances identification is only tentative. The successful interfacing of high-performance LC with mass spectrometry would greatly assist some of these problems.

The radioimmunoassay described, using either the tritium-labeled material or the iodinated radioligand, gave a sensitivity down to 50 pg of Δ^9 -THC. Cross-reactivity was present but not serious, although potential cross-reactivity with the newer synthetic cannabinoids was not discussed.

This volume is a comprehensive picture of the current state of the art with respect to cannabinoid analysis and will be of great value to laboratories working in this area. The book is moderately priced and has an extensive index.

Sisa Inc.

John F. Howes

Books of Interest

Methods of Biochemical Analysis. Volume 25. By David Glick. Wiley, New York. 1979. vii + 382 pp. 16 × 23 cm. \$29.50.

Cadmium Toxicity. Modern Pharmacology-Toxicology. Volume 15. By John H. Mennear. Marcel Dekker, New York. 1979. viii + 224 pp. 15.5 × 23 cm. \$25.00.

Physicochemical Aspects of Protein Denaturation. By Savo Lapanje. Wiley, New York. 1978. 16 × 23.5 cm. x + 331 pp. \$27.50.

Renal Prostaglandins. Volume 1. 1977. Annual Research Reviews. By James B. Lee. Eden Medical Research, St. Albans, Vt. 1979. 238 pp. 15 × 21.5 cm. \$24.00.

Somatostatin. Volume 1. 1977. Annual Research Reviews. By Mary T. McQuillan. Eden Medical Research, St. Albans, Vt. 1979. 227 pp. 15 × 21.5 cm. \$20.00.