

Book Reviews

Structure-Activity Relationships among the Semisynthetic Antibiotics. Edited by D. PERLMAN (University of Wisconsin). Academic Press, New York, 1977. xi + 739 pp. \$47.00.

This book gathers together a series of eleven review articles recording research in the area of chemical modification of fermentation products for the production of better antibiotics. Thirteen of the fourteen contributors are affiliated with pharmaceutical houses. Many of the chapters were originally prepared for publication in *Advances in Applied Microbiology* as long ago as 1970. Three of the chapters present updates of older reviews. Extensive lists of references numbering 80 to 250 citations are included. The structural classes dealt with include penicillins, cephalosporins, aminoglycoside antibiotics containing 2-deoxystreptamine, tetracyclines, actinomycins, rifamycins, lincomycin, and coumermycins. The stated objectives in the preparation of these reviews were to report on structure-activity relationships and the effects of molecular manipulations on the chemistry and biological activities of these antibiotics; to present an evaluation of the literature in this area; and to provide some projections as to the future of molecular manipulation of these compounds. A tremendous amount of detailed information has been presented. The volume would have been better if the one-page preface had been expanded to provide the reader with a better overview of the purposes of the volume and the approaches used to achieve these purposes.

Peter C. Jurs, *Pennsylvania State University*

Rigid Chain Polymers: Synthesis and Properties. Edited by G. C. BERRY and C. E. SROOG (Carnegie-Mellon University). John Wiley & Sons, Inc., New York, 1978. v + 222 pp. \$15.00.

This soft-cover issue is No. 65 in the Polymer Symposium series of the *Journal of Polymer Science* and is the proceedings of a symposium held at the March 1977 Meeting of the American Chemical Society in New Orleans. The volume contains 16 of the 18 presented papers, but does not contain the questions or comments of the audience and is not indexed. The papers are an unbalanced blend of broad overviews, theoretical developments, specific synthetic efforts, and detailed rheological and spectroscopic investigations. Notably absent are mention of the liquid crystalline behavior of polyisocyanates and the synthesis and characterization of polysaccharides and poly(nucleic acids).

This volume does contain excellent coverage of several important and recent developments concerning rigid chain polymers. Five of the 16 papers deal with the synthesis and properties of aromatic polyamides (aramids) and the related poly(amide-hydrazides). These polymers are becoming increasingly important as high-modulus, high-strength fibers with applications in tire cord, bullet-proof vests and helmets, and boat hulls, for example. The excellent properties are generally obtained by wet spinning of concentrated anisotropic or liquid-crystalline solutions. The relationship between the solution and solid-state properties is described in some detail.

Several papers discuss experimental and theoretical aspects of the liquid-crystalline behavior of poly(amino acids) and include rheological behavior and the relationship between solution anisotropy and helix-coil transitions. Other synthetic polymers investigated were based on acenaphthalene, phenylacetylene, diacetylenes (in the solid state), phenylsiloxane (with a ladder polymer structure), and phenyl-substituted phenylene repeat units. Heterocyclic polymers contained quinoline, benzoxazole, benzobisoxazole, and the completely ladder BBL structures. Emphasis throughout was on physical behavior, especially of anisotropic or liquid-crystalline solutions. This volume provides some background and a reasonably current overview of this increasingly important area. While it would be useful to those seeking an introduction to the field, being a symposium collection it is most valuable to those actively working with rigid chain polymers.

Lon J. Mathias, *Auburn University*

Methods of Biochemical Analysis. Volume 25. Edited by DAVID GLUCK (Stanford Research Institute). John Wiley & Sons, Inc., New York, 1979. vii + 383 pp. \$29.50.

This series has achieved widespread acceptance because it attempts to present the methods which are in use at the forefronts of bio-

chemistry. Volume 25 contains five chapters on topics of current interest, written mostly by well-known investigators. Over 750 references are cited and good indexes provided.

The first chapter, "The Application of High Resolution NMR to Biological Systems" by Campbell and Dobson, is quite extensive, constituting 40% of the book. It does a creditable job of filling the need for a thorough review of the methods in use. The chapter begins with a discussion of concepts basic to NMR which is pitched at an intermediate level, skipping rather directly from physical phenomena to descriptive equations. The role of background sections in a review of complex technical material is always difficult, the result usually being that it is useful neither to the newcomer nor to the expert. These authors have succeeded to a significant extent. Having read this material the neophyte should be able to appreciate the remainder of the chapter, which includes discussions of equipment, resolution, assignment, and measured properties. Overall it is a well-organized and executed review. Those previously uninitiated in high resolution NMR should come away with a feeling of excitement over possible applications to their own work.

"Immobilized Enzymes in Biochemical Analysis" by Everse, Ginsburgh, and Kaplan covers the preparation, use, and applications of immobilized enzymes. There is much interesting and well-illustrated material here, although the organization is not as good as it might be. The use of bold type for the subheadings under headings which were not in bold type is particularly confusing. "Separation and Quantitation of Peptides and Amino Acids in Normal Human Urine" by Lou and Hamilton reviews the progress in this area since 1962. Having worked in this area for many years, the author's account is sprinkled with interesting bits of chromatographic history. They begin with separation methods and conclude with methods for quantitative and qualitative determinations. The basis for the division of material between these two sections and the relationship between their titles and contents is not immediately clear. Sandwiched in between is an extensive catalog of newly identified amino acids and peptides. Molecular structures are included in the table, a practice which should be more widely followed in the chemical literature.

Two shorter chapters finish out the volume. "Mapping of Contact Areas in Protein-Nucleic Acid and Protein-Protein Complexes by Differential Chemical Modification" by Bosshard presents a useful extension of chemical modification which has not yet been widely applied. In "Determination of the Activity of Lipoygenase," Grossman and Zakut review the literature and make specific recommendations. Their chapter is not quite as readable as the other four. Overall those consulting this "silver" volume should find the experience rewarding.

David J. Miner, *Lilly Research Laboratories*

Material Characterization Using Ion Beams. Edited by J. P. THOMAS and A. CACHARD (Université Claude Bernard (Lyon I)). Plenum Press, London-New York, 1978. xviii + 517 pp. \$49.50.

This volume of lectures from a 1976 NATO summer school is a gourmet's guide to the alphabet soup of acronyms for material characterization using ion (and electron) beams. The menu covers more than fifteen entrées from AES (Auger Electron Spectroscopy) to SIMS (Secondary Ion Mass Spectroscopy) including RBS (Rutherford Back Scattering), PIXE (Particle Induced X-Ray Emission), and the unpalatable but useful BILE (Beam Induced Light Emission). The casual diner, however, will need to start with dessert by reading the General Conclusions (page 499) first. Here the techniques, their (dis-)advantages, and applications are outlined in a redaction of the three-week school. One can only wish that the editors had seen fit to expand this section and move it to the front of the book. This, however, is the only criticism that can be leveled at the book which describes state-of-the-art techniques in the important and rapidly advancing field of chemical and structural analysis using low-energy accelerators.

The text, which is entirely in English, is divided into four parts, the first of which considers energy loss by fast charged particles in matter and the techniques for producing ion beams. Part II discusses the application of keV ion and electron beams to the study of surfaces using ISS (Ion Scattering Spectroscopy), BILE, AES, and ESCA

(Electron Spectroscopy for Chemical Analysis). Analysis of material at greater depths (Part III) generally employs SIMS with beam-erosion techniques or MeV particles and RBS, PIXE, or PRA (Prompt Radiation Analysis of beam-induced nuclear reactions). The use of channeling of ion beams along preferred axes in crystals to study defects and the location of impurities in the lattice is the topic of Part IV.

A combination of cookbook and guide to elegant dining, this work will serve both the expert in accelerator-based characterization techniques by virtue of its comprehensive overview and 700-plus references, and the nonexpert with a problem in search of a solution. Definitely a three-star rating. *Bon appétit.*

Stewart Ryan, *University of Oklahoma*

Advances in Biochemical Engineering. Volume 11. Edited by T. K. GHOSE (Indian Institute of Technology, New Delhi), A. FIECHTER (Eidgenössische Technische Hochschule, Mikrobiologisches Institute, Zurich), and N. BLAKEBROUGH (University of Reading, Weybridge, Surrey, England). Springer-Verlag, Berlin, 1979. 180 pp. \$39.60.

This latest volume of a series will be of interest to biochemical engineers. Topics covered are statistical models of cell populations, mass and energy balances for microbial growth kinetics, methane generation by anaerobic digestion of cellulose-containing wastes, the rheology of mould suspensions, and scale-up of surface aerators for waste water treatment. References are included.

M. C. W. Smith, *Ann Arbor, Michigan*

New Processes of Waste Water Treatment and Recovery. Edited by G. MATTOCK (Water and Environment Group, Society of Chemical Industry, London). Ellis Horwood Ltd., Chichester. 1978. 415 pp. \$60.00.

Civil engineers and scientists interested in waste water technology will appreciate the up-to-date coverage presented in this collection of papers. Part 1 is concerned with gas transfer and includes oxygen transfer, pressurized low-energy gas transfer, and the effect of bubble size. Part 2 consists of seven chapters devoted to biological treatments. Sludge treatments are discussed in Part 3. Combined biological-physicochemical treatments and physicochemical treatments are the subjects of Parts 4 and 5. The final part is devoted to protein recovery.

M. C. W. Smith, *Ann Arbor, Michigan*

Water Pollution Research. Proceedings of the 8th International Conference, Sydney, Australia, 1976. Edited by S. H. JENKINS. Pergamon Press, Oxford. 1978. ix + 1060 pp. \$120.00.

This is an encyclopedic work containing 79 papers. It covers every imaginable aspect of water pollution research. Among the more unusual papers are those describing the use of fish as biomonitors.

M. C. W. Smith, *Ann Arbor, Michigan*

Fermentation and Enzyme Technology. By DANIEL I. C. WANG, CHARLES L. COONEY, ARNOLD L. DEMAINE (Massachusetts Institute of Technology), PETER DUNNILL, MALCOLM D. LILLY (University College London), and ARTHUR E. HUMPHREY (University of Pennsylvania). John Wiley & Sons, Inc., New York. 1979. ix + 374 pp. \$25.00.

This book presents fundamentals of biochemistry, microbiology, and chemical engineering and was designed as a text for a fermentation technology course at MIT. Topics covered are coordination of microbial metabolism, biosynthesis of primary and secondary metabolites, bioconversions, regulation of enzyme production, fermentation kinetics, continuous culture, kinetics and engineering of medium sterilization, aeration and agitation, translation of laboratory, pilot and plant scale data, instrumentation and control, enzyme isolation, kinetics, and immobilization, and enzyme reactors. References are included.

M. C. W. Smith, *Ann Arbor, Michigan*

Toxicology, Biochemistry and Pathology of Mycotoxins. Edited by KENJI URAGUCHI (Tokyo University of Agriculture, Sakuragaoka, Tokyo) and MIKIO YAMAZAKI (Research Institute for Chemobiodynamics, Chiba-ken, Japan). Kodansha Ltd., Tokyo. 1978. viii + 288 pp. \$27.50.

Six chapters, each contributed by a specialist, cover all aspects of the problem of mycotoxins. Chapter 1 reviews the current scope of mycotoxin research from the viewpoint of food mycology. Chapters 2 and 3 are concerned with the chemistry, toxicology, and biochemistry

of mycotoxins. Morphological and functional damage to cells and tissues is discussed next followed by a chapter on the carcinogenicity of mycotoxins. The final chapter is titled Aflatoxin: Investigations on Traditional Foods and Imported Foodstuffs in Japan. References are included. Physicians, food technologists, and biochemists should find this an extremely useful and interesting book.

M. C. W. Smith, *Ann Arbor, Michigan*

Toxicity of Heavy Metals in the Environment. Part I. Edited by F. W. VEHME (Kansas State University). Marcel Dekker, Inc., New York. 1978. x + 515 pp. \$45.00.

This book covers in some detail toxicity aspects of lead, cadmium, mercury, arsenic, selenium, copper, and molybdenum. Chapter 2 gives a very brief review of other heavy metals. The book is not especially useful for an expert in one of the heavy metal areas. Rather it is a quite readable, but not in-depth, review of the toxicity of the seven metals listed above.

Chapter 3 contains some much needed information for converting from ash weight to dry weight for a variety of food stuffs. It is unfortunate that the literature is not consistent in reporting concentrations of trace metals. Ash weight, dry weight, and wet weight are all used.

The chapters on lead and mercury, while not done in depth, are well worth reading. There is an unfortunate repetitive error in Chapter 7 where micrograms are used when the author meant milligrams. The discussions in Chapters 12 and 13, which deal with cadmium and mercury, are more story-like at times and thus scientific facts are sometimes difficult to separate from the authors' strong feelings. The concept expressed by the author in Chapter 13 that no threshold exists at the cellular level for alkyl mercury is disturbing. Dose response relationships are the keystone of toxicology. Far more proof than this author offers is needed to accept his concept.

The reviews of arsenic and selenium in Chapters 16-18 are well done for those who wish an overview of the field. Chapters 19 and 20, on the other hand, are short, detailed scientific papers.

I recommend this book to the person who has a casual need for quick information on the toxicity of metals. It has more than adequate references to direct you elsewhere if you wish detailed information.

Gary L. Ter Haar, *Ethyl Corporation*

The Molten State of Matter. By A. R. UBBELOHDE (Imperial College). John Wiley & Sons, Inc., New York. 1978. xiv + 454 pp. \$58.95.

This book is not, as the title might suggest, about liquids. Rather, it is a slightly updated version of the author's earlier book: "Melting and Crystal Structure" (Oxford, 1965). The chapter titles (save one) are the same. Eighty percent of the figures are taken from the older book. Most of the newer material is the author's own. Unfortunately new material is not well integrated with old.

The author states that "the primary objective of this book is to discuss thermodynamic properties of the molten state, in terms of its structure". He argues that most liquids near their melting point more closely resemble crystals than any other state. One can insert defects of various kinds into a given crystal and compute the thermodynamic properties of the melt. Various kinds of crystalline order or cohesive energy may then be used to classify the corresponding liquids. Materials such as Ge are regarded as anomalous under this scheme.

After introductory chapters on topics such as melting and fusion Ubbelohde states his basic tenets in Chapter 5. The structure of melts is described in terms of "quasicrystalline" and "anticrystalline" aspects. These terms are nonetheless not well defined until page 344 (p 245 in the older book). Chapters 6 through 10 discuss melting in particular types of crystals: molecular, ionic, metallic, etc. Special cases such as liquid crystals, glasses, and polymers are discussed in Chapters 14, 16, and 17, respectively. The remaining chapters cover theories of melting, premelting, and prefreezing phenomena, and nucleation.

This reviewer could not decide upon an audience likely to find this book profitable. Certainly those who own the older book will find little reason to buy this one. There is much evidence of hasty preparation. Textual passages taken from the 1965 book refer to tables that were not retained. There are numerous grammatical flaws. Much pertinent recent work is ignored.

This book must be regarded as a disappointing product from an author of outstanding reputation.

James C. Thompson, *University of Texas*