

## Book Reviews

**Heavy Metal Toxicity, Safety and Hormology. Environmental Quality and Safety Supplement 1.** Edited by T. D. LUCKEY, B. VENUGOPOL, D. HUTCHESON, FREDERICK COULTON, and FREIDHEIM KORTE. Academic Press, New York, N.Y. 1975. 120 pp. \$14.50.

As indicated in the title, the book is divided into three sections. The first deals with the toxicology of nonradioactive heavy metals and their salts which are discussed by group in the periodic table. This section will have limited appeal since it has been written in a highly technical jargon (e.g., "... in vitro multiple cytophagy which is the phagocytosis of erythrocytes and thrombocytes by leukocytes and alteration in cellular consistency, especially karyoplasmatic alteration of absorbing elements ..."). It could have been arranged so that the discussion and summary preceded the toxicology of individual elements. The section on safety is short (7 pp) and is restricted to their safety as nutritional markers. The last section, however, is well written and concise. **Hormology**, defined as the "study of and/or knowledge of excitation or stimulation", provides a logical and realistic alternative to the popular legislative concept of zero tolerance. The author makes a good case for the use of the "zero equivalent point" in establishing maximum tolerances. In summary, the book may be useful as a reference for those already knowledgeable in the field but falls far short of the depth suggested by the title.

Richard Delumyea *Great Lakes Research Division  
University of Michigan*

**Advances in Carbohydrate Chemistry and Biochemistry. Volume 30.** Edited by R. STUART TIPSON and DEREK HORTON. Academic Press, New York-San Francisco-London. 1974. xi + 529 pp. \$37.50.

This volume of the "Advances" comprises seven chapters and an obituary article on David J. Bell (1905-1972), a distinguished British carbohydrate chemist noted for his work on methylated monosaccharides. Three of the chapters in this volume are parts of two-chapter sequences: these are Chapter I, "Applications of Gas-Liquid Chromatography to Carbohydrates", which is Part II of an article that appeared in Volume 28; Chapter V, "The Application of Enzymatic Methods to the Structural Analysis of Polysaccharides"; and Chapter VII, "Bibliography of Crystal Structures of Carbohydrates, Nucleosides and Nucleotides 1970-1972", which are Parts I of two-part sequences to be concluded in subsequent volumes. The reader finds some difficulty in following these split chapters, particularly their second parts. Thus, for example, Chapter I, by G. G. S. Dutton, starts with reference number 732 and includes several references already mentioned in Part I (Volume 28), forcing the reader to go from one volume to the other to follow the article. Starting the reference numbers by 1 and repeating some of the references quoted in Volume 28 would have made reading much easier. It is hoped that this organizational problem will be remedied in subsequent volumes.

The two-chapter sequence on gas-liquid chromatography is an exhaustive review covering 1163 references. It will be of value to those interested in structural work on polysaccharides by degradation and identification of the resulting monosaccharides and oligosaccharides by gas-liquid chromatography.

Chapter II, "Structures and Syntheses of Aminoglycoside Antibiotics", and Chapter III, "Biochemical Mechanisms of Resistance to Aminoglycoside Antibiotics", are interrelated. The authors, S. and M. Umezawa, have published several papers jointly. The two chapters record achievements in the area of aminoglycoside antibiotics and emphasize the role of Japanese investigators. They open the way to planned chemical modifications of antibiotics to overcome deactivating enzymes.

Chapter IV, "The Metabolism of  $\alpha,\alpha$ -Trehalose," is by Allan D. Albine. Current interest in trehalose arises from the fact that it is the principal sugar in the circulatory system of insects. The chapter will be of interest to insect physiologists and could help pesticide chemists develop insecticides capable of blocking vital enzymes. Chapter V, "Application of Enzymatic Methods to the Structural Analysis of Polysaccharides, Part I", by J. John Marshall, discusses some 450

papers on the use of enzymes in the structural elucidation of glucose polymers with particular emphasis on amylopectin and glycogen. Great achievements have been made in this area by supplementing classical techniques of structural analysis of polysaccharides with enzymatic methods. Chapter VI, by Raymond Sidebotham, discusses some less complex polysaccharides, namely dextrans, and emphasizes the work on dextrans produced by bacteria grown on sucrose substrate; it reviews the literature from 1960 to 1973. The last chapter, "Bibliography of Crystal Structures of Carbohydrates, Nucleosides and Nucleotides from 1970 to 1972", by George A. Jeffery and Muttaiya Sundaralingam, is Part I of a two-part series on crystallographic data, and will certainly prove useful as reference material.

The editors of Volume 30 have done a marvelous job of integrating the original manuscripts submitted to them into a single volume that is coherent and interesting to read. This volume, like the earlier ones in this series, is very well written and will be widely used by researchers and students in carbohydrate chemistry, biochemistry, agricultural chemistry, polymer chemistry, medicinal chemistry, food chemistry, pharmacology, etc. It will be indispensable to any science library, whether in an academic institution, a medical center, or an industrial organization.

Hassan S. El Khadem, *Michigan Technological University*

**Advances in Polymer Science (Fortschritte der Hochpolymeren-Forschung). Volume 17. Polymerization.** By A. CASALE (Montecatini-Edison), R. S. PORTER (University of Massachusetts), and W. H. SHARKEY (E. I. duPont). Springer-Verlag, Berlin-Heidelberg-New York. 1975. 103 pp. \$24.10.

This 17th volume in a valuable series perhaps should be entitled more appropriately "Reviews in Polymer Science", as most of the work covered was done in the 1950's and '60's. This in no way detracts from the value of this book which covers two highly interesting and potentially useful areas of polymer chemistry.

"Mechanical Synthesis of Block and Graft Copolymers" describes ways in which such copolymers are formed as a result of free radical processes initiated by mechanical means. Under high shear primary chemical bonds in a polymer backbone may undergo homolytic scission to form free macroradicals. These, in turn, may react with another polymer molecule, another macroradical, or a polymerizable monomer to form block or graft copolymers. The subject matter is organized into five categories according to the "state of matter" (sic) in which the mechanical synthesis is conducted: solid, rubbery, molten, solution, and one entitled "polymer-filler interactions". The information is covered with economy of style, so that a very large body of descriptive information is conveyed in the 71 pages of this review, much of it in the 32 figures and 23 tables, covering 112 references.

The great majority of work described involves mechanical working of polymers, natural and synthetic, glassy and rubbery, in the presence of monomers. Graft/block copolymerization is apparently readily achieved in a few tens of minutes in ordinary equipment (e.g., Vibromill for solid state, and roll mill or extruder for rubbery state). It appears that almost any combination of polymer and monomer is possible by these means. The remaining topics, including polymer-polymer reactions, molten and solution systems, and polymer-filler reactions are dealt with rather superficially. The discussions of reaction mechanisms are generally not to be taken seriously. Minor annoyances, including lapses in good English usage, rather too many typographical errors, and undefined symbols, should not detract from the general usefulness of this work.

"Polymerization Through the Carbon-Sulfur Double Bond" deals with the fascinating chemistry of thiocarbonyl compounds, their synthesis, polymerization, and the properties of their polymers. Much of the work was done by Sharkey and his collaborators at the Central Research Laboratories of DuPont. The style of this chapter is lucid and terse; it is largely descriptive, covering thioformaldehyde, thioacetone, higher thiocarbonyl compounds, and the corresponding fluoro-thiocarbonyl compounds. The reader will find that these monomers rapidly homo- and copolymerize by both ionic and free radical

mechanisms. The derived polymers are of varying crystallinity. Some of the polymers are of very high molecular weights and possess outstanding chemical resistance. Most have a low glass transition temperature,  $T_g$ , and some have elasticities higher than any other polymers, including natural rubber. Some of the polymers described appear to be little more than curiosities, in that they decompose at or below room temperature. It is conceivable that such unstable polymers are awaiting applications as chemical reagents. There are 70 references.

Robert M. Fitch, *Institute of Materials Science  
University of Connecticut*

**Chemical Information Systems.** By JANET E. ASH (Information Services Consultant) and ERNEST HYDE (ICI Pharmaceuticals Division). Halsted Press, John Wiley & Sons, Inc., New York, N.Y. 1975. x + 309 pp. \$29.95.

Anyone seriously attempting to study, implement, or use chemical information systems would do themselves a favor by reading this book. It introduces, explains, and gives excellent examples of the state of the art in computer technology as applied to the handling of chemical information. To pick any chapters as individual standouts would be to slight all others. Nevertheless, the reviewer was impressed by the excellent chapter on Industrial Information Services by H. F. Dammers. It presents requirements of users, special needs of industry, a general outline of what to expect in making a transformation to management of data by computer, general system design, and aspects of cost effectiveness. The latter is also discussed in a chapter by Cawkell and Garfield on cost effectiveness and benefits of information services.

Chapter 7, by editor E. Hyde, deals with chemical structure systems with instructions, explanations, and possible uses. No book on this subject would be complete without information on chemical notation. Chapters 8, 9, and 10 present superior explanations of Wiswesser Line Notation and the Dyson-IUPAC Notation. Examples are many and clearly explained.

Janet E. Ash has written a chapter on the role of connection tables in a system. For those researchers involved in substructure searches or fragment generation, the reviewer especially recommends reading it. There are three well-written chapters on handling large chemical files. The IDC System is presented by Fugmann and the ICI CROSSBOW System by Eakin. Every bench chemist would be excited to have access to a computer-managed chemical reaction index as detailed by Valls and Schier in Chapter 15.

In Chapter 16, Craig presents a comparison of the Hansch Multiple Parameter Approach and the Free-Wilson Additivity Model in structure-activity correlations.

The authors are to be congratulated on a very timely and needed book.

Frederick F. Giarrusso, *The Squibb Institute for Medical  
Research*

**The Alkaloids. Volume 5 (Specialist Periodical Reports).** Senior Reporter: J. E. SAXTON (University of Leeds, England). The Chemical Society, London. 1975. x + 303 pp. \$48.25.

The fifth volume of this series, which has become indispensable to workers in alkaloid chemistry and important to all whose interests touch natural products, is now available; and not least among its many benefits, it encourages a look back at progress made in the field since the publication of Volume 1 in 1971. In no area of alkaloid chemistry has recent progress been more spectacular than in biosynthetic studies; as R. B. Herbert says in the first chapter of Volume 5, "the gross topography of the biosynthesis of almost all of the plant bases is now known." In this chapter, the unfolding of the subject is set forth in the critical, concise, and felicitous manner characteristic of the whole volume, and the further challenges to detailed understanding of the pathways are discussed clearly. As well as the main alkaloidal families generally so considered, compounds such as the mitomycins, anthramycin, prodigiosin, and the betalains are dealt with.

Later chapters consider the main alkaloid families. New and novel compounds continue to be isolated, and some varied structural types have been obtained from unusual sources, e.g., ladybirds and orchids. In at least some instances, a clear biological role for the alkaloids can be discerned. A noteworthy aspect of structure determination has been the application of  $^{13}\text{C}$  NMR, especially to indole alkaloids. This family and the  $\beta$ -phenethylamines and isoquinolines remain the centers of chemical activity in the alkaloid field. Syntheses are discussed with

exceptional clarity and economy, with points of particular interest being emphasized.

A final chapter deals with "miscellaneous" alkaloids, and will be diverting to those who work among the larger groups, as well as to other organic chemists. Maytansine, whose antitumor properties have brought it to clinical application, is among this miscellany; with maytansine, the *Catharanthus* bisindoles, and the host of other physiologically active alkaloids, there can be no doubt that the alkaloid field continues to have medicinal significance equal to its intellectual interest.

In his Foreword, Dr. Saxton gracefully alludes to the indebtedness alkaloid chemists feel to the work of the late Sir Robert Robinson; we may also thank Dr. Saxton and his fellow Reporters for five years of valuable and excellent work in the preparation of this series.

Philip W. Le Quesne, *Northeastern University*

**Carbohydrate Chemistry. Volume 7 (Specialist Periodical Reports).** Senior Reporter: J. S. BRIMACOMBE. The Chemical Society, London. 1975. 611 p. £22.00.

This volume covers carbohydrate literature published in 1973. As in the past, the reporters have done an excellent job in compiling this concise but very useful volume. Part I deals with the chemistry of mono-, di-, and trisaccharides and includes NMR spectroscopy and conformational features of carbohydrates, infrared spectroscopy mass spectrometry, and x-ray crystallography. In this part alone 868 references have been cited. Part II which deals with macromolecules has 313 references, and excellent efforts have been made to cover all aspects of polysaccharide chemistry and biochemistry. The chapter on enzymes and chemical synthesis and modification of oligosaccharides, polysaccharides, glycoproteins, enzymes, and glycolipids are especially outstanding. The referee recommends this edition to all interested in carbohydrate literature.

T. L. Nagabhushan, *Schering Corporation*

**Chemical Analysis of Ecological Materials.** By S. E. ALLEN, H. M. CRUINSHAW, J. A. PARKINSON, and C. QUARMBY. (Institute of Terrestrial Ecology), Halsted Press, John Wiley & Sons, Inc., New York, N.Y. 1974. x + 565 pp.

This text is suitable as a general reference of basic sample handling and wet chemical techniques for soil, vegetation, and water samples. Some applications are given for instrumental techniques (i.e., atomic absorption, flame emission, and x-ray fluorescence spectroscopy; polarography; gas chromatography). A basic understanding of the mechanics and chemistry of the methods and their limitations is presented. A section on automated analyzers contains many practical notes on operating procedures and trouble-shooting. The excellent references for these methods give this book the power and depth necessary for a working reference text.

The authors have compiled, in a readable and logical manner, a multitude of hints and practical experience for handling of natural samples. Specific pollutant analyses are not treated in depth. Each section reiterates the theme that the analysis is only as good as the original sample. The text is instructive, particularly if one were initiating a small general testing laboratory, and could find use at the undergraduate level in an ecoscience laboratory course.

M. C. Henry, *Eastman Kodak Company*

**The Chemist in Industry (3), Management and Economics.** By M. H. FREEMANTLE (Polytechnic of the South Bank). Oxford University Press, London. 1975. vii + 78 pp. \$10.50.

This little monograph is number 34 of the Oxford Chemistry Series and the third volume of a "series within a series" dedicated to providing "some understanding of the role of the chemist in industry and some of the problems he faces."

The book is a well written, well organized overview of the non-chemical realities that the scientist encounters in industry. Topics covered are the Systems Approach, Organization, Human Relations, Analysis and Control, Research and Development, and Project Evaluation. Although an amazing amount of information is presented in a small number of pages, the text presents little more than an introduction to each of these subjects.

Perhaps the most serious limitation of the book to an American reader is that it was written for the chemist in Great Britain. This is most evident in the examples drawn from industry and in the chapter on Organization. In addition, there are far too few references cited at the end of each chapter, and nearly all of them are British.

John B. Hooper, *Eastman Kodak Company*