

Book Reviews*

Waste Heat Management and Utilization. Edited by S. S. LEE and S. SENGUPTA. Hemisphere Publishing Corp., New York. 1979. xxii + 2541 pp. \$247.50.

This is a three-volume set of proceedings of a conference held in Miami in 1977. It consists of a large number of addresses and technical papers concerning the problem of waste heat produced in industrial and power-generating operations. The conference was broadly interdisciplinary, and dealt with waste heat both as an environmental concern and as a poorly utilized resource. The magnitude of the subject may be gauged from the fact that for every unit of steam-generated electricity produced, two units are wasted as heat. Utilization of this heat by chemical methods would be most interesting, but the papers on utilization were mostly concerned with agricultural or horticultural aspects. Is this a challenge to us?

Chemistry Careers. By L. B. TAYLOR, JR. (Dow Badische Co.). Franklin Watts, 730 Fifth Ave., New York, N.Y. 10019. 1978. 62 pp. \$4.90.

This little book is written for the uncommitted student at the high-school or beginning college level. It describes areas for careers in chemistry and such related fields as sales and marketing, patent law, safety and hygiene, and information services. It tells what amount and type of education is required and salary expectations, as well as the nature of the work.

Atlas of Stereochemistry: Absolute Configurations of Organic Molecules. Volumes 1 and 2. By W. KLYNE and J. BUCKINGHAM. Oxford University Press, New York. 1978. Vol. I: xix + 236 pp. \$49.50. Vol. II: xi + 241 pp. \$49.50.

This is a completely revised edition of the work originally published about five years ago, and it now incorporates material reported up to the middle of 1976. As before, it is essentially a classified table, showing structural formulas with indicated stereochemistry, and the pertinent references. Volume I is essentially the same as the first edition, which covered the literature of 1971, except for corrections to older configuration assignments. Volume II is a supplement covering the ensuing 4½ years, and follows the same organization. It contains author, subject, and formula indexes to the entire work. Those who already have Vol. I will probably wish to buy only Vol. II of the new edition.

Handbook of Reactive Chemical Hazards. Second Edition. By L. BREITHERICK (British Petroleum Co.). Butterworths, Woburn, Mass., and London. 1979. xxviii + 1281 pp. \$115.00.

It is only five years since the first edition of this useful work appeared, and in that time the world has been endowed with a considerable number of new hazards involving reactions that may proceed uncontrollably or explosively, with or without the production of noxious substances or fire. As a result, this edition is about 25% larger. Access to the information in it has been made much easier by the inclusion of a name index to supplement the formula-index arrangement of the text, and structural formulas are now provided for most entries.

This book should be regarded as an essential reference for laboratories where chemistry is going on, and one can make a good case for having it in the laboratory itself rather than in a possibly distant library. It quickly tells one of the possible dangers in handling particular compounds, either alone or in the presence of other materials, and the information is backed by specific examples and by references.

Chemical Engineering Drawing Symbols. By D. G. AUSTIN. John Wiley & Sons, Inc., New York. 1979. xv + 96 pp. \$19.95.

Chemical engineers make use of process flow diagrams and engineering line diagrams to communicate the constitution of a production process. A large body of symbols has grown up to represent the components, such as reactors, separators, valves, fractionating columns, etc. etc., and it can be confusing and time-consuming to identify a symbol that one is not familiar with, whether one is the reader or the draftsman. This book is designed to alleviate the problem by providing

a comprehensive set of graphic symbols, organized for ready reference and succinctly described. The scope is impressive: there are even separate symbols for a heap and a stack! Nearly all the book is composed of graphics, but there is a page of abbreviations, rather pleasing in their almost bucolic simplicity, such as PLGD (plugged) and XXS (double extra strong).

Handbook of Graphic Presentation. Second Edition. By CALVIN F. SCHMID and STANTON E. SCHMID. Ronald Press, New York. 1979. vii + 308 pp. \$12.95.

The Preface states "This book is a working manual for all who are concerned with the clear presentation and interpretation of statistical data in graphic form." The book consists of a very large number of examples of different types of charts, graphs, and figures, grouped in nine categories, plus chapters on projection techniques and computer graphics. It should be an eye-opener to most chemists for writing research papers and textbooks.

New Processes of Waste Water Treatment and Recovery. Edited by G. MATTOCK. Halsted Press/John Wiley & Sons, New York. 1978. 415 pp. \$60.00.

A three-day "research symposium" held in 1977 by the Society of Chemical Industry gave birth to this volume of proceedings. The 26 papers have been edited and carefully organized into such topics as gas transfer, biological-physicochemical treatment, etc. The subjects range from the fundamentally scientific, such as "Kinetics of Activated Carbon Adsorption", to the applied, such as "Microbial Conversion of Piggery Waste to a Protein Feed Supplement" (feed for whom, one wonders with disquiet).

Food Engineering: Principles and Selected Applications. By MARCEL LONCIN (University of Karlsruhe) and RICHARD LARRY MERSON (University of California, Davis). Academic Press, New York. 1979. xix + 494 pp. \$44.00.

This book embraces such chemical aspects as thermodynamics, analysis, biochemical kinetics, colloid science, and detergency. It treats the subject as much as possible from a scientific and quantitative point of view, as contrasted to the empirical approach hitherto commonly used. The intended audience seems to be chemical engineers, and to some extent chemists and biochemists. It has both a pedagogic intent (there are problems to be worked) and a reference intent (the bibliography is extensive).

Medical and Biologic Effects of Environmental Pollutants: Airborne Particles. By Subcommittee on Airborne Particles. University Park Press, Baltimore, Md. 1978. xi + 343 pp. \$18.00.

This softbound book is a report prepared by the Subcommittee on Airborne Particles of the Committee on Medical and Biologic Effects of Environmental Pollutants of the Division of Medical Sciences of the Assembly of Life Sciences of the National Research Council of the United States. It considers those particles that are associated with general types of air pollution, with emphasis on particles that result from the activities of man. Such aerosols are treated from the standpoints of both measurement and effects. A concluding chapter gives a summarized assessment and recommendations.

Handbook of Industrial Energy Analysis. By I. BOUSTEAD and G. F. HANCOCK (The Open University, Milton Keynes). Halsted Press/John Wiley & Sons, Inc., New York. 1979. 422 pp. \$69.50.

Energy analysis is the calculation of the energy used in manufacturing a product from ultimate raw materials, and is a subject that has assumed much importance in industrial management in recent years. This book begins with a chapter on energy analysis and thermodynamics, and then tackles aspects of industrial application from both theoretical and empirical standpoints in eleven additional chapters.

Carbon-13 NMR Shift Assignments of Amines and Alkaloids. By MAURICE SHAMMA and DAVID M. HINDENLANG. Plenum Publishing Co., New York. 1979. xi + 303 pp. \$29.50.

* Unsigned book reviews are by the Book Review Editor.

Except for four pages of text, five pages of references, and an index, this book consists of a group of lists showing structural formulas with the ^{13}C shift assignments indicated. The authors' aim was to gather together the known ^{13}C NMR data of alkaloids, broadly interpreted to include related structures such as simple pyrrolidines, pyrroles, pyridines, piperidines, and even enamines. Entries are listed two or three to a page to allow uncluttered display, and are accompanied only by a name and a reference. This arrangement is particularly convenient for rapid inspection. The literature has been covered through 1977, but the list is representative rather than encyclopedic.

Recent Developments in Nitrogen Fixation. Edited by W. NEWTON, J. R. POSTGATE, and C. RODRIGUEZ-BARRUECO. Academic Press, New York. 1977. xxiii + 622 pp. \$52.00.

This is the proceedings of the second International Symposium on Nitrogen Fixation, held in Spain in 1976. It consists of 36 papers that are reports and reviews of recent research, without experimental details, but with figures, tables, and references. The high interest in and rapid growth of the field are demonstrated by the fact that there have already been two subsequent symposia on the subject, including the third in this series, which took place in 1978.

Science of Materials. By WITOLD BROSTOW (Center for Advanced Studies, Mexico 14, D.F.). Wiley-Interscience, New York. 1979. xx + 436 pp. \$29.50.

The science of materials has received recognition only in recent decades, as it assumed form out of an amalgamation of metallurgy, ceramics, polymer science, physical chemistry, mineralogy, etc. The present book arose from the lecture notes for a course of instruction, and is constructed so as to be useful to students of chemistry, physics, and engineers, and to scientists in engineering who wish to bring themselves abreast of a subject which may not have been a part of their formal education. The presentation is quite scientific; graphs, tables, and diagrams are present in profusion, but pretty but useless pictures of edifices, machines, and other artifacts are absent.

Principles of Organic Synthesis, Second Edition. By R. O. C. NORMAN (University of York). John Wiley & Sons (Halsted Press), New York. 1978. xiii + 799 pp. \$19.95.

This edition, like the first, is intended for "those who have had a brief introduction to organic chemistry", to present a broad understanding of organic synthesis unified by concepts of mechanism. It would be suitable for use in an introductory graduate-level course in the subject. It contains problems to solve, and suggestions for further reading (books), but its potential for use as a reference work is severely curtailed by the nearly total lack of references to journal articles.

The first five chapters, which present principles and concepts of mechanism, have been little changed, and are not entirely up to date (e.g., the discussion of Bredt's rule), but the remaining 16 chapters, in which mechanism is developed and applied to practical synthetic reactions, have been expanded and brought up to date. The chapter on pericyclic reactions has been entirely rewritten, and a new chapter on synthetic photochemistry has been added. Many new reagents that have become important in the decade since the first edition are incorporated at appropriate places. These features give the book significant value to the chemist who has been long out of the university and wishes to become abreast of the impact of mechanistic insight on the understanding of the scope and limitations of synthetically important reactions. On the other hand, the reader who looks for more than introductory enlightenment on the design of organic syntheses, i.e., organization of individual reactions into a rational, efficient, multi-step synthesis, will be disappointed, for only one chapter of 64 pages, "The Synthesis of Some Naturally Occurring Compounds", touches on the subject. It is essentially a display of eleven synthetic schemes with explanatory notes, except for the first five pages, which are very new indeed for presenting such subjects as stereochemical control and the concept of synthons in any detail. It is appropriate for the audience stated in the preface, however.

Reagents for Organic Synthesis, Volume 7. By MARY FIESER and LOUIS F. FIESER. John Wiley & Sons, Inc., New York. 1979. 487 pp. \$32.50.

Hardly a practicing organic chemist can be unaware of this useful series and not have been saddened by the death of Professor Fieser since the publication of the previous volume. Admirers of these books will be pleased to read in the preface the implied promise of future

volumes, although this one is the last to bear both the Fieser's names.

This volume covers the literature of 1976 only. As customary, it contains entries ranging in size from a short paragraph to several pages, arranged in alphabetical order of reagent name, and embraces both inorganic and organic reagents, and new reagents or newly reported uses of old ones, with demonstrated usefulness in synthesis. It is no matter if one does not know what to look up, for there are three indexes: one according to type of reagent (including a section beginning "Synthesis of . . ."), and author and general subject indexes. This volume maintains the value of the series as a means of moderately current awareness as well as a practical reference manual.

Structural Stability in Physics. Edited by W. GÜTTINGER and H. EIKEMEIER. Springer-Verlag, New York. 1979. viii + 311 pp. \$38.00.

This volume contains the proceedings of two international symposia, on Applications of Catastrophe Theory, and Topological Concepts in Physics, held in 1978 in Tübingen, West Germany.

Paint Flow and Pigment Dispersion, Second Edition. By TEMPLE C. PATTON. John Wiley & Sons, Inc., New York. 1979. xxiv + 631 pp. \$42.00.

This book is subtitled "A Rheological Approach to Coating and Ink Technology", and is offered as a "comprehensive overview of the current rheological and related aspects of" the fields of paint and ink technology. It is concerned with such subjects of interest to chemists as viscosity, surface and colloid chemistry, solubility, and dispersion, in addition to arcane engineering subjects such as "mill base let-down".

Stochastic Differential Equations, Proceedings of an International Symposium. Edited by K. ITÔ. John Wiley & Sons, Inc., New York. 1978. 307 pp. \$35.00.

The subject of this symposium, held in Japan in 1976, is entirely mathematical, but will be of special interest to chemists concerned with diffusion.

Encyclopedia of Electrochemistry of the Elements, Organic Section, Volume XIII. Edited by A. J. BARD and H. LUND. Marcel Dekker Inc., New York. 1979. xii + 370 pp. \$75.00.

The volume is comprised of chapters on organometallic compounds, nitro and nitroso compounds, azo, azoxy, and diazo compounds, compounds with three or more nitrogen atoms in a chain, and derivatives of hydrazine and hydroxylamine. Substantial to major portions of the chapters consist of tables of polarographic and voltammetric properties. Emphasis is on electrochemical properties and mechanisms of reduction and oxidation rather than preparative uses, and although the primary readership is assumed to lie in analytical chemistry, the collected information, accompanied by references, would nevertheless be useful to chemists interested in synthesis. This volume is independently indexed.

Catalysis, Volume 2. Edited by C. KEMBALL and D. A. DOWDEN (University of Edinburgh). The Chemical Society, London. 1978. 276 pp. \$49.00.

This is part of a continuing series which reviews various aspects of heterogeneous and homogeneous catalysis with emphasis on the former. This particular volume contains ten chapters written by contributing authors on the following topics: hydrocarbon reactions on multimetallic catalysts, ammonia synthesis, hydrogenation of carbon monoxide, heterogeneous photocatalysis, catalytic properties of oxide solid solutions, hydrogenation of alkenes and alkynes, catalytic chiral synthesis, homogeneous catalytic oxidation, heterogenized homogeneous catalysts and electrocatalysis.

Each of the chapters is thoroughly referenced (including the patent literature) and thus provides an excellent reference document for researchers. While the main emphasis is on recent advances in basic research, valuable connections are made to industrial practice particularly in the chapter on hydrocarbon reactions on multimetallic catalysts. The chapters range in length from 15 to 35 pages and provide uniform coverage of each of the topics within easily digestible dimensions.

True to the intended purpose, this volume provides in-depth specialist coverage of several topics of interest to catalytic chemists.

J. M. White, University of Texas

Amino Acid Determination: Methods and Techniques, Second Edition (revised and expanded). Edited by STANLEY BLACKBURN. Marcel Dekker, Inc., New York. 1978. x + 367 pp. \$34.50.

In preparing the second edition of "Amino Acid Determination", Dr. Blackburn has followed the current trend of calling upon several colleagues to contribute chapters along their particular expertise. Blackburn wrote several extensive, detailed chapters on sample preparation and hydrolytic methods, special applications such as estimation of unusual amino acids, separation of enantiomers, determination of tryptophan and cysteine, etc., and an optimistically extensive chapter on gas chromatographic methods.

George W. Robinson contributed five short chapters reviewing development of ion exchange techniques, factors affecting separation of amino acids, buffer systems, detection systems, and automation of amino acid analyzers. These chapters are too cursory and general in themselves, but are nevertheless useful because of their extensive reference to original literature. A short chapter by Roger Stansfield, A. M. C. Davies, and M. W. Johnson on application of computers to amino acid analysis is also too general to be useful by itself, but is also reasonably well referenced.

A chapter by A. C. Van Steirteghem and D. S. Young on amino acids in physiological fluids is a very clinically oriented review, not in keeping with the general tenor of the rest of the book.

A short chapter by K. Hempel, H.-W. Lange, and N. Lustenberger gives an excellent and detailed account of the pyridoxal method of amino acid analysis introduced by them in 1972.

The work concludes with a brief epilogue by Blackburn, a complete author index, and a much less complete subject index. Although Blackburn disclaims the book's use as a practical laboratory manual, many chapters may serve just that function.

This edition does not repeat significant material from the first edition, and contains neither obsolete methods nor techniques which have changed little since 1968. For this reason, the second edition is a valuable addition to, but not a replacement of, the first edition of this monograph.

Harry C. Winter, *The University of Michigan*

Chemistry and Biochemistry of Amino Acids, Peptides, and Proteins. Volume 5. Edited by BORIS WEINSTEIN (University of Washington). Marcel Dekker, Inc. New York. 1978. xi + 355 pp. S.F. 84.

This volume is the fifth of a series begun in 1971 and, like the previous ones, is a collection of reviews covering a random assortment of topics. Each review is, in general, well written and informative.

The volume begins with a succinct chapter, "Protein Inhibitors of Nonproteolytic Enzymes", and refers mainly to nucleases and amylases. The chapter is unfortunately abbreviated and lacks the most recent work which should have been available because of the untimely death of the author, Beatrice Kassell. Even so, the review contains 147 references, through late 1976, and does an excellent job considering it is only 29 pages long.

Chapter 2 is "The Applications of Light-sensitive Chemicals for Probing Biological Processes", by F. J. Darfler and A. M. Tometsko. It is a very readable account of the chemistry of photoprobes, and their applications to the study of enzymes, membranes, subcellular particles, whole cells, and tissues. Much hard data are presented in these sections in six tables, some of which are quite extensive, and nine graphs. The literature is covered through 1977 and even into early 1978.

Chapter 3, "Application of Aldehyde and Ketone Condensates as Protecting Groups in Peptide Chemistry", is a brief chapter by B. Halpern. It is primarily concerned with use of aldimine, ketimine, and enamine derivatives of amino acids for peptide synthesis. Chapter 4, "Conformation of Angiotensin II", by R. R. Smeby and S. Ferdmandjian, is a detailed review of work through 1977. It is a highly specialized chapter, of great value to anyone at all concerned with the angiotensin system, but not of great general interest in protein or peptide chemistry.

The final two chapters are of more general interest, although they deal with fairly specialized subjects: Chapter 5, "N^ω-Alkyldiamino Acids, Chemistry and Properties", by N. L. Benoiton, covers the chemical synthesis of N^ε-methyllysine, N^δ-methylornithine, N^ω-ethylidiamino acids, N^ω-mercaptoethylidiamino acids, N,N^ε-dimethyl- and N^ε,N^δ,N^ε-trimethyllysine, and peptides of these derivatives. Much of this section is a review of the work of the author. The properties of all of the derivatives and specific references are tabulated. Methods of detection and analysis are then covered, followed by a review of the N^ε-alkyllysines as enzyme substrates. It is an extremely valuable

chapter for anyone who may encounter such derivatives in his work.

The last chapter is "Chemistry of Pituitary Growth Hormone, Prolactin and Related Hormones, and Its Relationship to Biological Activity", by Michael Wallis. It covers in great detail the biological actions, purification, assay, structure, molecular evolution precursors, and structure-function relationships. This chapter alone comprises a third of the volume. Included are tables giving comparative structure of growth hormone and prolactin from various vertebrates, with emphasis on the molecular evolution of these closely related peptide hormones.

The volume concludes with an author and subject index. The latter does not seem to be very complete, and has some gross errors, apparently because of omission or transposition of subject headings.

Because of the specificity of the subjects of the chapters and their aforementioned random assignment to this volume, it alone cannot be recommended as a general treatise. However, the subject treatments in Volume 5 are all well done, and it is recommended to any person whose work touches upon any of these topics.

Harry C. Winter, *The University of Michigan*

Safety in Working with Chemicals. By MICHAEL E. GREEN and AMOS TURK (City College, City University of New York). Macmillan, New York. 1978. ix + 166 pp. \$4.95.

This is a text-like book intended as a guide for the professor and teaching assistant, a reference for the student, and a helpful summary for chemical safety committees. It is not intended to be an encyclopedia; it is intended to be an introduction. As far as it goes, it is introductory; I am not convinced that it goes far enough, even for an introduction.

Safety instruction is haphazard at most educational institutions, as the authors state, with very little, if any, attention given to the effects of chronic exposure. Few professors are even aware that repeated exposure to chromium(VI) compounds can cause perforation of the nasal septum; some do not know that such exposures often cause ulcers. Not all are aware that non-water-soluble chromium(VI) compounds are carcinogenic.

The above effects are described by Green and Turk. They are silent about the reaction of reducing sugars with oxygen (in the air) to form carbon monoxide in alkaline solutions; the properties of phosgene are not discussed. The bibliography is inadequate, with excessive emphasis on government publications and no mention (for example) of Bretherick's "Handbook of Reactive Chemical Hazards" (Butterworths) nor of Steere's "Handbook of Laboratory Safety" (Chemical Rubber Publishing Co.). Our own safety publications are not mentioned, nor is the reader informed that "Safety Data Sheets" for many chemicals can be obtained upon request from manufacturers. The inadequate though useful Merck Index and Sax' "Dangerous Properties of Industrial Materials" are listed.

Chapter titles include: Basic Laboratory Precautions, Laboratory Equipment Hazards, Reaction Hazards, Flammable and Explosive Chemicals, Toxic and Corrosive Substances, Physical Hazards, Cleaning Up the Laboratory, and Administrative Procedures. What is presented is useful. But many other important and useful matters are not treated. The concept of safety audits, for example, is not discussed. This concept is widely applied in the chemical industry; it is perhaps the single, most effective way to both reduce the frequency of accidents and to inculcate the necessary healthy respect for potential hazards. There is no discussion of the perhaps over-elaborate but effective Management Oversight and Risk Tree (MORT) technique.

Given the abysmal state of safety education and practice in educational laboratories today (man-hour for student-hour in the chemical industry compared to laboratory time in school labs, the accident rate in schools is typically several tens of times greater for colleges and universities than for the chemical industry), this book must be purchased and used. But one would also wish that the authors were fully informed before they began to write; perhaps this constructively intended review will encourage them to achieve this state before they prepare the manuscript for their second edition.

Jay A. Young, *Chemical Manufacturers Association*

Analytical Chemistry, Second Edition. By D. J. PIETRZYK and C. W. FRANK (University of Iowa). Academic Press, New York. 1979. xix + 700 pp. \$16.50.

The instructor chooses a text for an introductory level analytical course primarily on the bases of scientific content, presentation of

topics, and readability by the student. The second edition of this well-known text appears satisfactory on all three counts.

This is a text for an introductory course in classical analytical chemistry. The first sixteen chapters cover primarily the chemistry and technique of titrations: acid-base, precipitation, oxidation-reduction, and complex formation. From Chapter 17 on, the authors present a series of instrumental topics: absorption and emission spectrophotometry, chromatography, and electrochemistry. This choice of topics overlaps material on solution equilibria included in many current general chemistry texts, on the one hand, and some instrumental topics to be covered again in most instrumental analysis courses. With judicious assignment of chapters, the book could be made to fit a broad range of curricular requirements. Forty-one capsule experiments are included as an appendix.

The discussion of topics is well ordered and systematic. This reviewer would prefer to see the introduction of separations earlier than Chapter 22. This is both because separation logically precedes analysis and because separation is a topic that is new to most students with a background of general chemistry. Separation is also useful in the organic laboratory, often in the same year as "quant". It is regrettable that the authors do not develop a systematic method for solution of equilibrium problems by a "charge-balance, material-balance" approach. This is the proper place to develop rigorous and general methods that the student may carry forward to upper division and graduate applications.

The text material is well written by two experienced teachers. Many errors in the first edition have been corrected, but some disturbing ones remain. In more than one place pX is defined incorrectly as $1/(\log X)$, and the formula on p 360 shows four bonds to hydrogen. Real chemical reactions and good titration diagrams are abundant. The instrumental techniques are also illustrated with many realistic chromatograms, spectra, and polarograms, a desirable and unusual feature.

This text should be given serious consideration for a sophomore-level course in quantitative analysis.

Larry B. Anderson, *The Ohio State University*

Annual Reports on the Progress of Chemistry. Section B. Organic Chemistry. Volume 74, 1977. Senior Reporters: G. P. MOSS and J. H. P. UTLEY (Queen Mary College). The Chemical Society, London. 1978. xvi + 471 pp. \$44.00.

Section B of Annual Reports has been indispensable as a reference source for evaluation of the progress of organic chemistry, and the present volume is no exception. Although the 30 contributors to this volume have been asked to restrict the number of papers referred to in their articles, more than 2250 publications are referenced. Indeed, Annual Reports approaches the ideal of a complete survey of organic chemistry more than does any other published volume.

The topical format of the 1977 Annual Reports follows the organization of prior volumes with separate chapters devoted to Physical Methods (by T. P. Toubé, M. B. Hursthouse and S. Neidle, and P.-S. Song), Theoretical Chemistry (by G. Klopman and P. Andreozzi), Reaction Mechanisms (by R. J. Bushby, H. R. Hudson, and A. T. Bullock), Arynes, Carbenes, Nitrenes, and Related Species (by S. A. Matlin), Organometallic Chemistry (by A. Stewart, D. J. Thompson, M. V. Twigg, and M. G. Hutchings), Electroorganic Chemistry (by R. Lines), Photochemistry (by H. A. J. Carless), Aliphatic Compounds (by D. R. Taylor and R. S. Ward), Aromatic Compounds (by R. G. Coombes), Heterocyclic Chemistry (by A. J. Boulton), Alicyclic Chemistry (by A. Cox), Synthetic Chemistry (by G. Pattenden), and Biological Chemistry (by P. M. Collins, R. Baker, D. A. Evans, D. G. Buckley, M. C. Summers, and D. C. Williams). In addition, Volume 74 contains timely reviews of Insect Chemistry (by R. Baker and D. A. Evans), Ion-Molecule Reactions in the Gas Phase (by H. R. Hudson), Tetrapyrroles and Their Biosynthesis (by D. G. Buckley), and Ultraviolet and Visible Spectroscopy of Bio-organic Molecules (by P.-S. Song). Coverage of ORD/CD, NMR spectroscopy, alkaloids, nucleic acids, and biosynthesis is not included in the present volume.

Each chapter of Annual Reports—Section B references relevant reviews of topics associated with the chapter, and authors generally comment on highlights in their subject. The up-to-date coverage in this comprehensive survey of organic chemistry provides a valuable service to chemists. Every practicing chemist should have access to Annual Reports.

Michael P. Doyle, *Hope College*

Polysaccharide Shapes. By D. A. REES (Unilever Research Laboratory, Bedford). Chapman and Hall, London. 1977. 80 pp. \$?

This paperback edition is the 24th issue of a series of college books aimed at seniors in biological science to familiarize them with current research. The authors of this series have been asked to outline their subject and assume that their readers are merely acquainted with material found in introductory textbooks of biology. Accordingly, for a chemist, the book is both elementary and too descriptive. It is, however, well written and, for what it is intended, quite adequate.

Hassan S. El Khadem, *Michigan Technological University*

Carbohydrate Chemistry. Volume 10 (A Specialist Periodical Report). By J. S. BRIMACOMBE (University of Dundee). The Chemical Society, London. 1978. xiii + 524 pp. \$80.00

This tenth Specialist Periodical Report published by The Chemical Society in London reviews the literature in the field of carbohydrate chemistry from January 1976 to January 1977. Reviewed are 3197 papers, of which 975 deal with mono-, di-, and trisaccharides, and 2222 with macromolecules. These topics are discussed in two distinct parts of the report. Part I, the shorter of the two (204 pp), is divided into twenty chapters, and Part II is divided into only eight chapters. The two parts have been written by different sets of authors.

Part I, authored by J. S. Brimacombe, R. J. Ferrier, J. M. Williams, and N. R. Williams, starts with an introduction that lists the important developments and the pertinent review articles that have been published during the year. The other chapters include eight relatively large ones, dealing with: glycosides, esters, amino sugars, branched-chain sugars, antibiotics, nucleosides, NMR spectroscopy, and other physical methods.

Part II consists of a paragraph-sized introduction followed by seven chapters. The first deals with plant and algal polysaccharides and reviews the chemistry of starch, cellulose, gums, pectins, hemicellulose, and algal polysaccharides. It is followed by a short chapter on microbial polysaccharides. These two chapters, authored by R. J. Sturgeon, are followed by a longer chapter on glycoproteins, glycopeptides, and animal polysaccharides, reported by B. J. Catley. By far the longest chapter deals with enzymes and is authored by J. F. Kennedy. Glycolipids and gangliosides are reviewed in a short chapter authored by Sturgeon, which is followed by a long chapter authored by Kennedy on chemical synthesis and modification of oligosaccharides, polysaccharides, glycoproteins, enzymes, and glycolipids.

The Specialist Periodical Reports were started in 1967 by The Chemical Society, when it realized that it could no longer effectively review the year's publications in its *Annual Report* and launched the very successful Specialist Periodical Report series with the aim to provide systematic and comprehensive review coverage of the progress in the major areas of chemical research. The series has now reached some 36 titles, published either annually or biannually. This particular series on carbohydrate chemistry is published annually and has since 1970 been authored by Professor Brimacombe. It has through the years expanded and undergone significant improvements, making it indispensable for research workers in the area of carbohydrates. It supplements *Chemical Abstracts* by making it easy for a researcher to quickly review the developments that occur during the year in a particular field.

A minor organizational flaw should be mentioned: the references are numbered in a different manner in both parts of this issue. Thus, in Part I each chapter starts with reference no. 1, whereas the references throughout Part II are numbered consecutively. Apart from this negative comment, one can only praise Dr. Brimacombe and The Chemical Society for continuing to produce a very successful Specialist report.

Hassan S. El Khadem, *Michigan Technological University*

Occupational Health and Safety Concepts. By GORDON R. C. ATHERLEY (University of Aston in Birmingham). Applied Science Publishers, Ltd., London. 1978. xii + 408 pp. \$53.00.

The cost/benefit ratio, or the risk analysis of chemicals and processes, is being recognized as an essential part of scientific effort and control in the United States. It is refreshing to review the viewpoint of an expert from another industrial country highlighting the effects of chemicals on humans. Professor Atherley is a professor of safety and hygiene in England, and has rendered a real service by stressing three principal themes: (1) the input-output biological model (which traces and discusses the biological fate of chemicals); (2) selection and

implementation of action (which states clearly that any restrictions or controls have socio-economic, legal, scientific, and human components); (3) strategies for approaching controls with a common pattern, and proposed controls are often a compromise for reasons which are complex, going far beyond the limits of scientific knowledge.

The biological framework of the book is related to the biological systems which are most readily affected by chemical inhalation, ingestion, and cutaneous absorption. The body has certain defensive processes against such assaults. When overburdened, however, physiological effects (which Atherley calls disease) may occur. Bio-dumping, such as the elimination by body processes, may occur; whether the elimination speed is sufficient to prevent injury depends on a variety of factors which are discussed.

Case histories of the background data required to establish our even-now inadequate and incomplete understanding of the effects of ionizing radiation, aromatic amines, metals toxicity, asbestos, respiratory disease in the coal industry, gassing accidents, and the establishment of occupational exposure limits are worth reading.

The book is recommended to chemists and engineers who seek a more complete understanding of the interface of chemicals to humans, and to the approaches to control. The subject and treatment are timely and informative.

Howard H. Fawcett

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Phase Transitions in Solids. By C. N. R. RAO (Indian Institute of Science) and K. J. RAO (National Aeronautical Laboratory, Bangalore, India). McGraw-Hill International Book Co., New York. 1978. xi + 330 pp. \$34.50.

The subject of phase transitions in solids has become an important area of research in both chemistry and physics due in large part to the wealth of experimental techniques which have been brought to bear on this topic. This text fills a need which presently exists in the literature of solid-state chemistry and physics, namely a unified discussion and review of phase transitions. This book brings together such diverse fields as metallurgy and liquid crystals, and therefore should prove to be of interest to anyone who must deal with solids and their phase transformations. The authors state in the preface that the book can form the basis of a course in solid-state or materials science. It is the opinion of this reviewer that the book is not suitable as a textbook for such a course. This is because the book is mainly a review of the solid-state literature and, although it discusses such topics as second-order phase transitions, the renormalization group, and soft modes, a good background in lattice dynamics, group theory, and statistical mechanics is expected of the reader. The book does an excellent job of reviewing the literature, citing over 700 references. In this respect, Rao and Rao have created a valuable reference book for students and practicing scientists.

Some of the topics discussed in this book include thermodynamic classification of phase transitions and Landau's theory of second-order transitions in Chapter 2. Phase transitions in ionic solids as well as topotaxy and polytypism are among topics treated in Chapter 3. Chapter 4 discusses various kinds of phase transitions including Martensitic, order-disorder, spinodal and eutectoid decompositions, and transitions in glasses and organic solids. The statistical mechanics of phase transitions are treated in Chapter 5. This includes the Ising model, the Bragg-Williams approximation, and the renormalization group and critical phenomena. Chapter 6 is devoted to theories of soft modes. Finally Chapter 7, which comprises nearly one-third of the book, concentrates on magnetic, electrical, and dielectric properties of solids and on how these properties behave under phase transitions.

R. E. Wilde, Texas Tech University

Chemical and Biochemical Applications of Lasers. Volume III. Edited by C. BRADLEY MOORE. Academic Press, New York. 1977. 325 + ix pp. \$16.50.

In the first chapter of this volume, V. S. Letokhov and C. Bradley Moore treat uses of lasers in isotope separation. The authors present a series of photophysical and photochemical schemes which have been proposed or studied experimentally. There is a strong emphasis on real experimental results and on the physical effects which impose practical limits on the effectiveness of these techniques. The authors distinguish eight laser separation methods. Physical techniques include selective excitation and ionization, followed by physical separation of the

photoproduct species, and direct separation through differential light pressure. Chemical techniques emphasize selective reactions of electronically or vibrationally excited species; 376 references, some of which were not yet published when the book went to press, are included. Commercial prospects are emphasized by the long discussion of current costs of separating isotopes by other techniques. Besides ^{235}U and ^2H , other isotopes (some far more expensive) are considered. Applications of the same physical techniques to chemical analysis, and work on condensed systems, are briefly discussed.

In the other chapter of the volume, R. V. Ambartzumian and V. S. Letokhov treat multiphoton infrared photochemical processes; 122 references (a few from 1977) drawing heavily on Soviet results are included. The authors open with a discussion of experimental results on photoabsorption and photodissociation, followed with theoretical interpretations. Light-driven isomerization reactions, isotope separation experiments, and studies on mixed chemical systems and polyatomic molecules are covered in further sections. The volume closes with a discussion of other applications other than isotope separation, e.g., synthesis, materials purification, and spectroscopic studies of highly excited vibrational states.

George D. J. Phillips, University of Michigan

Immobilized Enzymes. Edited by I. CHIBATA (Tanabe Seiyaku Co. Ltd.) Wiley/Halsted, New York. 1978. viii + 284 pp. \$35.00.

In addition to an introductory chapter by Dr. Chibata, T. Tosa, T. Sato, and T. Mori (all of Tanabe Co.) have contributed chapters entitled: "Preparation of Immobilized Enzymes", "Properties of Immobilized Enzymes and Microbial Cells", and "Applications of Immobilized Enzymes and Microbial Cells". Although the subject of immobilized cells is not mentioned in the title, much space is allotted to this important area. In Chapter 2 a discussion of immobilized coenzymes appears.

This book is comprehensive and well documented. Figures and tables are used frequently. There are 1077 references. Valuable compendia of commercial sources of enzyme supports and bound enzymes are provided in the appendices.

Both newcomers and veteran researchers would be attracted to this book. The comprehensive discussions on applications are especially well done. The introduction and chapters on preparation and properties of immobilized enzymes and cells start with and build on fundamental concepts. This point and the comprehensive nature of the book make it appealing to many researchers with different interests and degrees of expertise.

G. Royer, The Ohio State University

Alicyclic Chemistry. Volume 6. Senior Reporter: M. A. MCKERVEY (University College, Cork). The Chemical Society, London. 1978. ix + 376 pp. £29.00; \$63.75.

Volume 6 in this annual series is a review of the literature in the field of alicyclic chemistry published during 1976. The book is divided into five chapters: Three-membered Rings (pp 1-93, 411 refs, by B. Halton), Four-membered Rings (pp 94-143, 185 refs, by I. Watt), Five- and Six-membered Rings and Related Fused Systems (pp 144-179, 217 refs, by N. M. D. Brown and D. J. Cowley), Medium- and Large-ring Compounds (pp 180-235, 288 refs, by E. J. Thomas), and Bridged Carbocyclics (pp 236-357, 564 refs, by G. B. Gill). Generally, each chapter is divided into areas of structure, physical and theoretical studies, synthesis, and reactivity. As in the past, the chapter dealing with five- and six-membered rings presents material of specific structural significance and selected coverage of reactivity and synthesis of relatively simple five- and six-membered ring systems. Included is an extensive table of contents and complete author index.

This series continues in the fine tradition established by The Chemical Society with all their Specialist Periodical Reports. The breadth of coverage is impressive and there seems to be remarkably few editorial errors for a book of this type; most importantly, there were no misreferences in the citations of primary interest to me. However, it would be helpful if all reporters gave *Chemical Abstracts* references for the Russian literature cited.

In agreement with the past reviewer of this series, I would hope that the editors are actively seeking ways to keep the market price as low as possible so that individuals will be able to add one or two reports to their library each year. These books provide excellent browsing material for the few quiet moments that one has from time to time. Unfortunately, I note a 14% increase in price over last year for a text with 14% fewer pages.

Arthur G. Schultz, Rensselaer Polytechnic Institute