

The manual as well as additional documentation supplied on the disk is all excellent. Tutorials for use of these fonts with MacDraw and MacPaint are supplied and should greatly facilitate learning to use these fonts.

Stereochemica. VI. Alantic Software: P.O. Box 299, Wenham, MA. List price for diskette and manual \$34.95.

Stereochemica is a disk [400K, 3.5 in.] based scrapbook of template drawing elements that are easy to combine in conjunction with MacPaint and the MacIntosh cut-and-paste (clipboard or scrapbook) routines. Written in the MacPaint format, one does not have to learn new techniques to use Stereochemica, but the accompanying manual can guide a novice MacPaint user to competent structures. The diskette illustration files are usable with the minimal MacIntosh (128K/400K internal disk drive) system and MacPaint program (ImageWriter or LaserWriter for hard copy). Additional memory, an external drive, and/or an Apple Switcher program simplify transfer of the Stereochemica-MacPaint building blocks to an opened drawing.

This enhancement of MacPaint is useful for preparing a number of simple Organic and Biochemical illustrations that are ordinarily too complex to create spontaneously in the undergraduate classroom or very

time consuming to prepare for homework or tests. Quality illustrations that supplement text book material with *another view* can easily be made on the MacIntosh system ready for conversion to a transparency, slide, or handout. The "low resolution" MacPaint illustrations prepared from the Stereochemica are not applicable to journal articles, limiting this package to undergraduate applications. It is well suited for 3-dimensional representations aiding the teaching of difficult concepts such as conformation and configuration. Critically viewing this package one must note an inherent "undergraduate" look, most noticeable in chiral formulations. Specifically, like the typical undergraduate, the Stereochemica data fail to reverse element combinations for right and left hand (bond to OH but no HO bond) representations which requires the user to create missing elements or wrongly present them in the "standard" undergraduate manner [i.e., C-HO]. Also not all of the chair and envelope forms dock without gaps. A nucleoside template is miss-drawn (both the heterocyclic and furanose systems have errors).

CONCLUSION: If one avoids computerized perpetuation of errors, applying the enhancement elements of the Stereochemica software can enrich undergraduate classroom presentations (lectures, homework, and tests).

T. A. Bryson, *University of South Carolina*

Book Reviews*

Crystal Growth. Volume 13. Edited by G. I. Givargizov. Consultants Bureau: New York, 1986. 369 pp. \$55.00. ISBN 0-306-18113-4.

"Crystal Growth" is a well-known book series that represents the English translations of the Russian book series entitled "Rost kristallov" published by Nauka Press, Moscow. As the preceding books of this series, Volume 13 is composed of a number of articles, in this case selected from presentations at the 5th USSR Conference on Crystal Growth held in September 1977 at Tbilisi. The change in editors from A. V. Shubnikov and N. N. Sheftal to G. I. Givargizov marks a redirection in the choice of articles. Judged by the exciting topics covered that for the most part are still under active study today, the new editor has been exceedingly successful with his selection although the long delay of the translation—9 years after the conference—in some cases painfully limits the impact of this book.

For example, the first article of the book, written by Boris K. Vainshtein, reviews the growth and structure determination of protein crystals and viruses. As a stimulus for enticing the traditional crystal growth community to contributing to this important field, the paper was in 1977 well ahead of developments in the western industrialized countries where professional crystal growth societies recognized the challenge only recently. Due to the substantial improvement of the speed of X-ray data manipulation by modern computers, crystal preparation has become the most time limiting step in the determination of the tertiary structure of biological macromolecules, e.g., proteins and nuclei acids. In view of the significance of structural information for progress in molecular biology and industrial developments, e.g., drug design by receptor recognition, this area of crystal growth deserves attention.

Although the presentation of Vainshtein is still of interest in this context it is somewhat outdated which holds, also, for a review of Mildvidskii and Dolginov on defect formation in III-V alloys and 3 articles by Tartachenko, Antonov, and Swek, et al., respectively, concerning meniscus controlled growth. The delay of the review by Dolginov is particularly unfortunate since his pioneering work on III-V alloys is well-known in the USA and elsewhere and stimulated in the mid-1970s the development of $Ga_xIn_{1-x}P_yAs_{1-y}/InP$ light sources and detectors for optical communications. Therefore, his paper alone, if published in time, would have assured great interest in the book by many western scientists and engineers. However, meanwhile there have been rapid advances in the understanding of III-V alloys, e.g., the recognition of critical phenomena and ordering, as well as considerable progress in processing that allows the growth of multiple quantum well heterostructures and strained layer superlattices with new effects concerning the generation and propagation of defects that are not mentioned in the review. Therefore, the paper of Mildvidskii and Dolginov is at this time totally out of touch and remains to be only of historical interest.

In spite of these short comings the book addresses many topics which have not lost in actuality. For example, a series of papers by Chernov and Ruzakin, Givargizov and Lavrentyeva et al., and Pashchenko et al.

addresses chemical vapor deposition of GaAs with emphasis on the effects of adsorption phenomena on the growth kinetics and selective epitaxy. To this are added contributions by Sokol et al., Sheftal and Klykov, Zhdanov and Medvedev, and Spitsyu, respectively, concerning the use of lattice imaging for the study of grain boundaries, graphoepitaxy of silicon, initial stages of heteroepitaxy, and crystal growth under thermodynamically metastable conditions. Also, the book contains a section entitled "New Materials' Equipment for Crystal Growth". Three articles are devoted to this topic including a review of the control of crystal growth processes by Lubl and a paper by Bagdarsarov on the use of laser heating in zone melting, pedestal pulling, and crystal growth by the Verneuil method. A particularly stimulating contribution is a paper by Rabenau on the growth of $CuTeX$ ($X = Cl, Br, I$) crystals. In the opinion of the reviewer, there is currently too little time spent with exploratory research, and including both technology related papers and fundamental research contributions is the best guaranty for creating a book that addresses contemporary problems, but retains validity over an extended period of time. G. I. Givargizov has shown considerable skill in creating such a mixture.

Klaus J. Bachmann, *North Carolina State University*

Numerical Recipes: The Art of Scientific Computing. By W. H. Press (Harvard-Smithsonian Center for Astrophysics), B. P. Flannery (EXXON Research and Engineering Company), S. A. Teukolsky (Cornell University), and W. T. Vetterling (Polaroid Corporation). Cambridge University Press: New York, Cambridge, and London. 1986. xx + 818 pp. \$39.50. ISBN 0-521-30811-9.

Numerical Recipes Example Book (FORTRAN). By W. T. Vetterling (Polaroid Corporation), S. A. Teukolsky (Cornell University), W. H. Press (Harvard-Smithsonian Center for Astrophysics), and B. P. Flannery (EXXON Research and Engineering Company). Cambridge University Press: New York, Cambridge, and London. 1986. vii + 179 pp. \$18.95. ISBN 0-521-31330-9.

Numerical Recipes is a comprehensive, practical guide to numerical analysis. It contains over 200 computer subprograms to implement the many numerical algorithms discussed in the book's 17 chapters. These computer programs are written in both FORTRAN and Pascal. Each FORTRAN subprogram is introduced by a highly informative discussion of the algorithms involved. These discussions not only present the mathematical basis for the algorithm, but the authors also incorporate the collective insight and experience of their diverse backgrounds in academia and industry.

The authors' primary theme in the book is to show "that practical methods of numerical computation can be simultaneously efficient, clever, and—important—clear". They have succeeded in their goal. For each algorithm considered, the reader is told the why's, the do's, and the don'ts. Insight and understanding not found in similar books is plentiful. The authors' discussion of random numbers is an excellent example of this. Certain innovative approaches, such as the method of simulated an-

*Unsigned book reviews are by the Book Review Editor.

nealing in minimization problems and robust estimation in statistical analysis, are also discussed. When competing numerical methods are given, the authors present lucid reasons why one method should be selected in preference to another. Some topics, such as the generalized eigenvalue problem, are not covered. However, references are provided to fill the gaps. In fact, excellent references can be found at the end of each section.

The programming style used by the authors is excellent. However, I believe that their use of the PARAMETER statement, to define the maximum value NMAX of a passed argument N, lessens the versatility of the library. In many instances, NMAX is used to dimension a vector. This vector could be dimensioned by the passed argument N, which would eliminate the necessity of defining NMAX.

The companion book, *Numerical Recipes Example Book (FORTRAN)*, is a collection of examples which utilize the subroutines listed in *Numerical Recipes*. Although the discussions which introduce each example FORTRAN program are brief, they are very informative and helpful.

As an added service, the authors make available (through their publisher) the complete library of computer programs, in both FORTRAN and Pascal. They may be obtained in various formats on floppy diskettes. It would be beneficial if they would also provide double precision versions of all programs.

These books are a must for anyone doing scientific computing. The informal style of the authors makes this a readable and understandable text on numerical analysis. They are useful texts for those just learning numerical computation as well as those already experienced in the area. I truly enjoyed reading these books and recommend them highly.

Libero J. Bartolotti, *University of Miami*

Osmotic Investigations. By W. Pfeffer (University of Basel); a translation and republication of the 1877 edition by G. R. Kepner and Ed. J. Stadelmann (University of Minnesota). Van Nostrand Reinhold Co.: New York. 1985. xxv + 267 pp. \$32.50. ISBN 0-442-27583-8.

This is a thoughtful, tidy translation of what must have been an equally tidy—and, the translators allege, important and thoroughly neglected—classic study of osmotic transport. Pfeffer, primarily a plant physiologist and professor of botany at Basel in the 1870's digressed from the descriptive physiology of his time for 3 years in order to study a phenomenon that he thought essential to understanding the life processes of plants. From this study came many precise data and quite a mass of turgid interpretation of them, the former providing van't Hoff with support for the thermodynamic theory of osmotic pressure. Pfeffer also secured and mused about data that are nowadays summarized as membrane reflection coefficients. In what was perhaps the style of the time, Pfeffer engaged in descriptions of no small length, both of what he did and what he theorized. All modern treatises I know, those I do and do not admire, are much more concise.

Why translate a technically and conceptually outmoded monograph 110 years after its original publication? To do a man justice and re-balance the history of science? To re-establish the link between the abstraction of osmotic transport in simple solutions through artificial membranes and the process as it is encountered in nature? To remind us of what can be measured precisely with patience and attention to detail in self-built apparatus of extraordinary simplicity? To provide the high entertainment, in the style of period pieces presented on educational television, of science practiced in a more leisurely time? Perhaps for all of these reasons. However, at least for me, the perambulatory quality of the text is insufferable, especially when Pfeffer tries to apply his observations to biological phenomena. I cannot see the thread of logic through long, qualitative "proofs". Charitably, however, it must be noted that the theory and methods of the time were just too poor to allow the use of physical theory to explain complex physical-biochemical phenomena such as cell motions and tropisms.

The translators seem faithful both to the mind and spirit of the author and to his ideas as they have evolved over time. The writing has a refreshing, declarative quality, clear and stylistically plain, and free of polemicism, if not fantasy.

Edward F. Leonard, *Columbia University*

Fundamental and Technological Aspects of Organo-f-Element Chemistry. Edited by Tobin J. Marks (Northwestern University) and Ignazio L. Fragalá (University of Catania). D. Reidel Publishing Co.: Dordrecht, Holland. 1985. xiv + 414 pp. \$56.00. ISBN 90-277-2053-3.

This monograph is the result of a NATO Advanced Study Institute held in Acquafredda di Maratea, Italy, in September 1984. It contains eleven chapters on organometallics of the f-elements and frontier elements (transition metals of Groups III and IV) based on lectures delivered by principal speakers.

The first six chapters deal primarily with syntheses, properties, and

reactivities. Chapter topics include organolanthanides (H. Schumann), actinide hydrocarbyls and hydrides (T. J. Marks and V. W. Day), organoactinide complexes of classical ligands (J. Takats), and [8]annulene complexes (A. Streitwieser and S. A. Kinsley). Also included in this group is a chapter on trivalent Group III and titanium compounds which are chemically similar to lanthanide analogues (J. Teuben) and a chapter on the expanding utility of lanthanides in organic synthesis (H. B. Kagan). The next three chapters deal with spectroscopic techniques applied to f-element compounds; included are discussions of optical spectroscopy of f^n ions and compounds (N. Edelstein), NMR spectroscopy of both diamagnetic and paramagnetic compounds (R. D. Fischer), and photoelectron spectroscopy of some representative organometallics (I. L. Fragalá and A. Gulino). The tenth chapter (P. Bergamini, S. Sostero, and O. Traverso) covers the photochemistry of f-element complexes and the final chapter (M. Bruzzone and A. Carbonaro) deals with f-element usage in heterogeneous petroleum cracking processes and homogeneous polymerizations.

In general, the chapters are well written, clearly organized, and extensively illustrated. Moreover, they are comprehensive reviews with substantial reference lists; emphasis is naturally placed on recent developments. The editors note that chapter authors were given a good deal of freedom so as to encourage the presentation of both personal viewpoints and unpublished results. In spite of this, the amount of overlap from chapter to chapter is not extensive; however, since each chapter is indexed separately a search for a specific topic may require perusal of more than one chapter index. As the list of topics implies, the coverage emphasizes fundamental over technological aspects. The latter are covered in the final chapter, as well as in small parts of some of the earlier chapters. This focus reflects the current state of the field; one suspects that technological developments will be given increasing weight in future meetings and proceedings.

Overall, this monograph represents an impressive survey of some of the most important aspects of a rapidly developing field, presented by active researchers. It will be an essential addition to science libraries and to the collections of those working in this or related areas.

Joseph W. Bruno, *Wesleyan University*

Chemistry and Chemical Taxonomy of the Rutales. Edited by Peter G. Waterman (University of Strathclyde) and Michael F. Grondon (The New University of Ulster). Academic Press, Inc.: New York. 1983. xv + 464 pp. \$75.00. ISBN 0-12-737680-1.

This book is based on the review lectures given at the Symposium of the Phytochemical Society of Europe held at the University of Strathclyde in 1982 and is Volume 22 in the Annual Proceedings of the Society. It is however much more than your usual symposium proceedings, cobbled together from camera-ready copy of a series of lectures with only marginal relationship to each other and sold at an outrageous price. This volume, whether by good planning of the original symposium or by good post-symposium editing, reads like a coherent account of the chemistry and chemical taxonomy of the subject order—the Rutales.

The order Rutales is only a medium-sized order of flowering plants, but it contains a diverse array of secondary metabolites, including various coumarins, chromones, flavonoids, and lignans, and, most intriguingly, a number of unique types of metabolite such as the acridone alkaloids, the limonoids, and the quassinoids. Some of these compounds, such as the citrus limonoids and flavonoids, have considerable economic importance, while others, such as acronycine and bruceantin, are of interest because of their antitumor activity. A survey of the chemistry of the order Rutales is thus a fascinating journey through a variegated landscape of natural products.

The book begins with a brief introduction to the order Rutales by A. D. J. Meeuse and then proceeds to a discussion of the biosynthesis of coumarins and quinoline alkaloids by M. F. Grondon. The heart of the book then comes in a series of chapters on the major classes of natural products in the Rutales, with chapters on the alkaloids (I. Mester), coumarins and chromones (A. I. Gray), flavonoids (J. B. Harborne), limonoids (two chapters by J. D. Connolly and D. L. Dreyer), quassinoids (J. Polonsky), lignans (J. O'Sullivan), and compounds from the Burseraceae (S. A. Khalid). The chapters by Mester, Gray, Connolly, and O'Sullivan give what appear to be complete lists of the compounds of a particular type isolated from the Rutales, while the chapters by Connolly, Dreyer, and Polonsky also explore the chemistry of their subject compounds. The concluding chapters include those with a more biological or taxonomic flavor, consisting of chapters on biological activity of some rutaceous compounds (J. R. Lewis), the chemistry of Citrus compounds (V. P. Maier), chemotaxonomy of the genus *Citrus* (R. W. Scora and J. Kumamoto), biogenesis and systematic significance of limonoids in the Meliaceae (D. A. H. Taylor), phylogenetic implications of the secondary metabolites (P. G. Waterman), and chemical characters and classification of the Rutales (R. Hegnauer).

The book appears to be relatively free of errors (although the structure of azadirachtin has been revised since it was published), and it achieves its aim of providing a comprehensive survey of the chemistry and chemotherapy of the Rutales. It will be of interest to workers in the area and perhaps also to synthetic organic chemists looking for interesting and challenging targets.

David G. I. Kingston, *Virginia Polytechnic Institute and State University*

Natural Inorganic Hydrochemistry in Relation to Groundwater. By J. W. Lloyd and J. A. Heathcote (University of Birmingham, UK). Oxford University Press: New York. 1985. 296 pp. \$45.00. ISBN 0-19-854422-7.

The noble objective of this book is to explain groundwater chemistry for the benefit of engineers and hydrogeologists. In this respect, not many new ideas are included in the book, but the way concepts are taken from an introductory to an advanced level is fascinating. In the first 50 pages, concepts such as activities of electrolytes, complex equilibria, and competing redox processes are introduced and explained. How this is done is worthy of investigation by every aqueous and environmental chemist especially if the person gives lectures on these subjects.

In the remainder of the monograph, subjects that people need to know in groundwater chemistry are introduced and developed. In this part of the book, three chapters are particularly noteworthy. The chapter on hydrochemical parameter measurement and sample collection contains a summary of procedures and methods that is hard to find in any one manuscript. The chapter on the representation of hydrochemical data again contains a comparison of interpretive methods that is powerful because of its inclusiveness. This section could become a first choice of where to go to compare data presentation techniques. The chapter on environmental isotopes again is an excellent summary of many of the isotopic methods used in groundwater research. It also will be a useful source of information and ideas for people who are not familiar with the subject.

In summary, the objective of the book to provide a comprehensive but simple explanation of groundwater chemistry is well-attained. Currently, hydrology is an area of intense interest in the fields of environmental chemistry and geochemistry, so publication of the monograph is well timed.

Thomas R. Wildeman, *Colorado School of Mines*

Chemical Industries Series. Volume 22. Catalysis of Organic Reactions. Edited by Robert L. Augustine. Marcel Dekker Inc.: New York. 1985. 416 pp. \$75.00. ISBN 0-8247-7263-6.

This is a collection of 22 papers presented at the Tenth Conference on Catalysis held in May 1984 in Williamsburg, VA.

The first five papers deal with homogeneous systems. Halpern reviews the most impressive achievements in the field of asymmetric hydrogenation of prochiral olefinic substrates. In some cases, reports the author, optical yields approaching 100% enantiomeric excess are obtained and the mechanism of such an enantioselection is related to higher reactivity of the minor diastereomer of the catalyst-substrate adduct corresponding to the less favored binding mode. The paper by Stille on the asymmetric hydroformylation via polymer-supported chiral catalysts, which can be separated from the products, is of great interest. Prospects are good for selective CH and CC bond activation in alkanes with transition-metal complexes (Crabtree et al.) whereas Giandomenico et al. try to look inside the catalytic hydrogenation of nitrogen heterocycles by studying the interactions of quinoline and tetrahydroquinoline with osmium carbonyl catalysts.

The second chapter is comprised of four papers devoted to H₂/CO reactions. Lunsford's report on the methanol synthesis over supported palladium catalysts shows the effects of the preparation technique, support nature, and promoters "classical however interesting because never fully understood" studies. Supported metal-cluster catalysts are open doors to new metal catalysts with unusual selectivity, particularly demanded in the domain of the synthesis-gas conversion. Temperature-programmed reaction and steady-state kinetics are two techniques used to study the CO hydrogenation over promoted and supported Ni catalysts. Smith et al. report that hydroformylation of butyl ether as process intermediate for 1,4-butanediol is more efficient than that of allyl alcohol.

Heterogeneous catalysis is the concern of the five next papers. Goodman tries to show that single crystals studied with special apparatus which combine kinetic and surface analytical capabilities can provide realistic models for studying reaction mechanisms otherwise difficult to imagine when true heterogeneous catalysts are used. Catalysts can be rendered enantioselective by chemisorption of asymmetric molecules acting as modifiers, Sachtler reports, and he also shows a certain preference for the "dual site model". Deposition of organometallic complexes of uranium and thorium on alumina can lead to very active (propylene)

hydrogenation catalysts, Burwell et al. report. The solvated metal-atom dispersion procedure provides very active (1-butene) hydrogenation Co-Mn/silica catalysts: Mn seems to affect the Co clusters in an electronic fashion as shown by Inizu et al. The funny amphora catalysts produced by subjecting slurry droplets of active catalyst to controlled drying conditions, display very interesting performance in several reactions.

Part IV is comprised of five papers that report various studies or processes using oxidation catalysts. Austin et al. describe some olefin-oxidation processes of industrial interest (including their novel selective vicinal hydroxylation). A better understanding of the selective oxygen-oxidation of sulfides to sulfoxides catalyzed by dihalo ruthenium(II) complexes is claimed by Riley, whereas Rossiter and Bommemann discuss the asymmetric epoxidation (of allylic alcohols for instance) and the C-C double-bond cleavage by molecular oxygen, respectively. A biotechnology touch is brought in by Patel with his paper on the oxidation of hydrocarbons by methane-utilizing bacteria.

In the traditional "Selected topics" chapter, the first paper provides some information about the effects of reaction variables in phenol hydrogenation, a step in the Allied caprolactam process. Preparation of aromatic nitriles in high yield from aromatic primary carboxamides or aldoximes by dehydration with acetic anhydride in the presence of certain transition metals or salts is exhaustively described in the second paper. The last paper reports the production of polyamines by aminomethylation of diene polymers, whose product distributions strongly depend on the catalyst system.

All this reflects today's trends in research and development, an upsurge of research activity in homogeneous catalysis which seems to be able to provide some useful theoretical supports to the heterogeneous catalysis. Although I usually do not like any book which covers a large number of fields with a rather limited number of papers, I think that the presence of this fairly well conceived volume within your reach is worthwhile.

Raymond Le Van Mao, *Concordia University*

Advances in Inorganic Chemistry and Radiochemistry. Volume 29. Edited by H. J. Emeleus and A. G. Sharpe (University Chemical Laboratory, Cambridge, England). Academic Press: Orlando, FL. 1985. ix + 335 pp. \$65.00. ISBN 0-12-023629-X.

Although the "radiochemistry" label remains a misnomer, Volume 29 continues the tradition of presenting timely reviews on either new areas of current interest or recent advances in fields of long standing. The topics of the six reviews range from main group to solid-state chemistry, with equal coverage of both transition-metal and organometallic topics, and thus, this volume will be of interest to a wide variety of chemists.

In the first review, C.-S. Liu and T.-L. Hwang describe in great detail the chemistry of the inorganic silylenes, SiH₂, SiCl₂, and SiF₂. The authors make no attempt to include every known reaction of these three species but give instead a systematic as well as critical review of the reaction mechanisms in which the silylenes are involved. The literature coverage is complete through 1984 (119 references).

J. F. Nixon, a significant contributor in the field of trifluorophosphine complexes, presents an updated review of the synthetic, structural, and spectroscopic aspects of PF₃ complexes of transition metals. This account covers the literature from 1975 to early 1984 with pertinent background references included (368 references). An up-to-date description of the bonding situation in PF₃ both as a free species and as a ligand is also given.

H. Yamada and M. Tanaka review the current understanding of the physicochemical aspects associated with metal carboxylate extraction. They caution against (1) the acceptance of stoichiometries for extracted species that seem unlikely, (2) the use of the conventional data treatment for determining the composition of the extracted species because of problems akin to the possible presences of polymeric species, and (3) the formation of heteropolynuclear carboxylates which must be considered in the separation of metal ions. Although the list of references (159 references) is extensive for a 22 page review, it is not exhaustive.

P. R. Raithby and M. J. Rosales review the synthesis, characterization, bonding modes, and reactivity of alkyne-substituted transition-metal complexes. The authors admittedly make no attempt to provide a comprehensive coverage but instead use recent examples from the literature to illustrate points of interest (471 references up to mid-1984). Two topics of potential importance to many readers have purposefully not been covered in depth because of recent reviews in these areas. These are u₃-alkylidyne complexes derived from rupture of the C-C triple bond in alkynes and clusters containing complex organic ligands resulting from the coupling of alkyne units.

J. M. Williams and K. Carneiro provide their views on organic superconductors based on the donors TMTSF or BEDT-TTF (ET). Following an overview of the current synthetic and electrocrystallization techniques, the crystallographic structures of these organic metals are analyzed and correlated with their solid-state properties in an attempt

to enumerate several key components necessary for preparing better synthetic metals. The majority of references are very recent (117 references up to mid-1985) as would be expected in this promising area of research.

S.-W. Ng and J. J. Zuckerman ask the following intriguing question: where are the lone-pair electrons in subvalent fourth-group compounds? Although this question can in principle now be answered by difference density analysis of X-ray results in systems where the lone-pair electrons are stereochemically active, this is not the topic of the review. The authors' interests lie instead in the identification of systems in which the lone-pair electrons are *totally* inert stereochemically, that is compounds in which the subvalent group-four atoms occupy perfectly symmetrical sites. Their discussion consists of only two discrete molecular examples with the rest being extended lattices. The literature coverages includes 178 references and is complete through 1984.

Overall, the choice and diversity of topics make this volume a worthwhile addition to the series. A subject index of nine pages is given, but no supplement listing the contents of previous volumes is included.

Joseph S. Thrasher, *The University of Alabama*

The ACS Style Guide. A Manual for Authors and Editors. Edited by Janet S. Dodd. American Chemical Society: Washington, DC 20036. 1986. \$24.95 ISBN 0-8412-0917-0. Paperback \$14.95. ISBN 0-8412-0943-X.

This slim volume is an expanded version of the earlier *Handbook for Authors*. In addition to the initial chapter on preparation of scientific papers, there are chapters on Grammar, Style and Usage; Illustrations and Tables; Copyright and Permissions; Manuscript Submission in Machine-Readable Form; The Literature: Becoming Part of it and Using it; and Making Effective Oral Presentations. There are several appendices covering the following: ACS Publications; Ethical Guidelines to Publication of Chemical Research; Symbols; Hints to the Typist; and finally Proofreaders' Marks and an Index.

From these headings alone it can be seen that the book could be useful. In fact anyone who writes scientific papers or lectures should have and *USE* this book.

There are many valuable suggestions that will help authors to prepare clear and concise presentations. There is even a short section that might help all of us to avoid "sexist" language: i.e., verbiage that suggests that males alone are responsible for—"whatever". For example, instead of "manpower" use "workers" or "staff". This is good. Judge for yourself the superiority of changing the following excerpt into "nonsexist" format.

Original: The LORD is my shepherd, I shall not want; he makes me lie down in green pastures. He leads me beside still waters; he restores my soul. He leads me in paths of righteousness for his Name's sake.

Non-Sexist: God is my protector, I shall not want; God makes me lie down in green pastures. God leads me beside still waters; God restores my soul. God leads me in paths of righteousness for God's sake.

There is a list of frequently misspelled words and an up-to-date list of abbreviations (22 pages of them). Unfortunately the spelling list has at least one small error. "Soxhlet" is incorrectly spelled "Sohxlet".

In some places there is, in my view, not general agreement with some of the recommendations. On page 4 the suggestion is made that "Series titles are of little value". Examination of *THIS JOURNAL* alone indicates that many authors and, I suspect, many readers do find them of some value. On page 13 the authors disagree with the widely recognized authority of Strunk and White on the proper verb to use in the sentence, "None of the samples *was* soluble." They prefer *were* to *was*. Strunk and White indicate that *was* is correct whenever "none" can be replaced by "not one".

One rather strange and not very useful table appears on p 87. Lithium propanoate is listed under Esters while compounds such as butyl chloride, benzyl hydroperoxide, and diethyl disulfide are listed under Salts.

The book provides tables of SI Units, Other Units in Use with SI, and Non-SI Units That are Discouraged. It is noted without further comment that authors in ACS Journals seem to prefer the older units, e.g., Kcal rather than KJ and torr or mm of Hg rather than Pa.

My final comment—buy it and use it.

Jordan J. Bloomfield, *University of Missouri—St. Louis*

Annual Reviews of Materials Science. Volume 16. Edited by R. A. Hughes (Stanford University), J. A. Giordman (Bell Laboratories), and J. B. Wachtman, Jr. (Rutgers University). Annual Reviews, Inc.: Palo Alto, CA. 1986. xii + 573 pp. \$64.00. ISBN 0-8243-1716-5.

The latest edition in the *Annual Review* series covering the materials sciences will surely come as a welcome addition to the libraries of those ever larger numbers of chemists interested in materials-related problems. A perusal of the table of contents reveals that in fact every chapter is likely to be of interest to some group of chemists, with over half of them speaking to a wide constituency within the chemical community. Topics

range from fields in which chemists have played the dominant role for some time (e.g., ion-selective electrodes) to those in which chemists have come to make contributions only more recently (e.g., nanostructures). Of the 22 total review chapters, four are dedicated to surface phenomena, fifteen consider bulk phenomena in detail, and three consider topics in which both play crucial roles. In addition, a terse yet stimulating preface by C. S. Smith of MIT examines the relationship between the historical development of materials technologies and man's efforts in art and science. As before, the table of contents has been subdivided into thematic functional groups: experimental and theoretical methods; preparation, processing and structural change; properties and phenomena; and special materials, with coverage divided roughly equally among them. On the whole, the chapters are a nice balance of tutorial, review of current work, and the authors' collective wisdom on the nature of future directions. The references tend to be heavily concentrated on recent efforts, as one would expect, but with introductory entries in all cases.

In summary, the volume does a nice job for the topics covered of providing either an entry point to the research literature or a critical evaluation and updated list of references, depending on the point of view of the reader. Although most individual chemists will not find a large enough fraction of the material to be of direct pertinence to justify personal purchase of the volume, many chemists will find sufficient material to spend a profitable few hours with it in their local library, and more than a few will find good reason to become intimately familiar with one or more of the reviews.

Paul W. Bohn, *University of Illinois*

Books on Applied Chemistry

Plywood and Adhesive Technology. Terry Sellers, Jr. Marcel Dekker: Basel and New York. 1985. xvi + 661 pp. \$99.75. ISBN 0-8247-7407-8.

The author's purpose "is to elucidate materials science and technology, with some market and economic criteria, relative to plywood and adhesive technology". Phenolic resins are considered, but chemistry is quite secondary.

Chemicals from Coal: New Developments. Edited by K. R. Payne. Blackwell Scientific Publications: Oxford and Palo Alto. 1985. vi + 122 pp. \$55.00. ISBN 0-632-01431-8.

The chemical aspects of coal utilization are reviewed in three chapters: Economics of Coal Conversion Processes, by J. Schulze and H. Gaensslen; New Developments in Obtaining Chemicals from Coal by Pyrolysis, by J. O. H. Newman; and Chemical Feedstocks by the Direct Liquefaction of Coal, by G. O. Davies.

Batteries for Implantable Biomedical Devices. Edited by Boone B. Owens. Plenum Press: New York. 1986. xxii + 358 pp. \$55.00. ISBN 0-306-42148-8.

The special requirements of power cells for a variety of medical applications and the technical means by which the needs have been met are taken up in 11 contributed chapters. Both chemical (lithium/halogen, nickel/cadmium, etc.) and nuclear batteries are considered.

Topics in Wastewater Treatment. Edited by J. M. Sidwick. Blackwell Scientific Publications: Oxford and Palo Alto. 1985. x + 113 pp. \$50.00. ISBN 0-632-01439-3.

Contains five contributed reviews, on activated sludge, filtration of effluents, anaerobic treatment, and byproduct recovery.

Forensic Science. Second Edition. Edited by Geoffrey Davies. American Chemical Society: Washington, DC. 1986. x + 388 pp. \$59.95. ISBN 0-8412-0918-9.

This book might have borne the title "Chemistry and Crime: A Professional Approach". In 21 contributed chapters, it deals with the collection and analysis of evidence by scientific methods, with strong emphasis on chemical analysis and identification, as applied to widely varied materials, from body fluids to arson debris.

Bailey's Industrial Oil and Fat Products. Volume 3. Edited by Thomas H. Applewhite. John Wiley & Sons: New York. 1985. xiv + 353 pp. \$55.00. ISBN 0-471-80951-9.

This is a supplementary volume to the 2-volume work of 1979, and it includes contributed chapters on storage, flavor assessment, instrumental analysis, packaging, deodorization, table spreads, and winterization.

Dioxin, Agent Orange: The Facts. By Michael Gough. Plenum Press: New York. 1986. 289 pp. \$17.95. ISBN 0-306-42247-6.

Once again innocent dioxin is blamed for the evils of dichlorodibenzodioxin. The author attempts to present a balanced, critical analysis of the facts and evidence surrounding the cause-and-effect relationships

between the indicted substance and human health, with attention to Agent Orange, the Seveso disaster, and toxicity studies. Interestingly written, and understandable by the informed layman.

Process Plant Layout. Edited by J. C. Mecklenburgh. John Wiley & Sons: New York. 1985. xiv + 625 pp. \$89.95. ISBN 0470-20238-6.

This is a comprehensive treatment of the spatial arrangement of everything to do with a chemical plant, from piping and utilities to storage, power plants, fire escapes, and even toilet facilities. A remarkable feature of this book is an Anglo-American Glossary, which informs the reader that American "shutdown" is an English "permanent shutdown", whereas an English "shutdown" is an American "turnaround", among many other fascinating equivalents (e.g., "Rube Goldberg" equals "Heath Robinson").

Integrated Circuits: Chemical and Physical Processing. Edited by Pieter Stroeve. American Chemical Society: Washington, DC. 1985. x + 348 pp. \$69.95. ISBN 0-8412-0940-5.

A collection of 16 symposium papers dealing with semiconductors, photoresists, etc., of importance in the manufacture of integrated circuits.

Chemical Engineering: A Review for the P.E. Exam. By William E. Crockett. John Wiley & Sons: New York. 1985. xii + 269 pp. \$31.95. ISBN 0471-87874-X.

A text for a review course designed for employees in the chemical industry who are preparing to take the Principles of Engineering Examination.

Chemical Process Simulation. By Asghar Husain. John Wiley & Sons: New York. 1986. xii + 376 pp. \$34.95. ISBN 0470-20201-7.

Gives a comprehensive treatment of computer-aided simulation as a means for optimizing the commercialization of a chemical process, in a form that allows use as a text at the graduate level.

Economic Evaluation in the Chemical Process Industries: A Guide to Prudent Planning. By Oliver Axtell and James M. Robertson. John Wiley & Sons: New York. 1986. xiv + 241 pp. \$44.95. ISBN 0471-80464-9.

The authors intend this book for those "who are called upon to evaluate the economics of chemical processing ventures". In six chapters, they discuss principles, capital, production cost, capacity economics, year-by-year economics, and computer programs.

Process Modeling. By Morton M. De-n. Longman Inc.: New York (distributed by John Wiley & Sons: New York). 1986. xii + 324 pp. \$34.95. ISBN 0470-20668-3.

This book arose out of a graduate-level course taught by the author. In it he emphasizes the importance of the "use of physical principles to arrive at a proper mathematical formulation" of a chemical process model. Three case studies are included: activated sludge wastewater treatment; fiber spinning; and coal gasification.

Fiber Chemistry (Handbook of Fiber Science and Technology Series). Edited by M. Lewin and E. M. Pearce. Marcel Dekker: Basel and New York. 1986. 1120 pp. \$195.00. ISBN 0-8247-7335-7.

This book is one of a five-volume set intended to summarize and organize the present state of knowledge in the area of fibers and fabrics. The 12 contributed chapters cover "the most important natural and man-made synthetic fibers". Each is discussed from the standpoints of source or synthesis, structure, physical and chemical properties, chemical modification, and applications and marketing. Extensive bibliographies and a good subject index make the book a useful reference.

Petrochemicals. By P. Wiseman. Ellis Horwood: Chichester (distributed by John Wiley & Sons: New York). 1986. 182 pp. Hardcover: \$39.95. ISBN 0470-20279-3. Paperback: \$19.95. ISBN 0470-20284-X.

This book is based on courses given at the University of Manchester and gives a general treatment of the important chemistry involved in the conversion of petroleum alkenes and derivatives, aromatic hydrocarbons, ammonia, methanol, etc., etc. A short list of further readings but no references are given, as well as some exercises (with answers at the back) and an index.

Procédés de Pétrochimie. Caractéristiques Techniques et Économiques. Tome 1: Le Gaz de Synthèse et ses Dérivés, les Grands Intermédiaires Hydrocarbonés. Tome 2: Les Grands Intermédiaires Oxygénés, Chlorés

et Nitrés. Second edition. By Alain Chauvel, Gilles Lefebvre, and L. Castex. Editions Technip: Paris. Volume 1: 1985. xviii + 456 pp. FF 380. ISBN 2-7108-0485-9. Volume 2: 1986. xiv + 455 pp. FF 410. ISBN 2-7108-0486-7.

These two volumes take up the chemical engineering side of the manufacture of chemicals from petroleum: Volume 1 deals with olefins, aromatic hydrocarbons, methanol, urea, ammonia, hydrogen, CO₂, and formaldehyde. Volume 2 treats alkene oxides, glycols, acetic acid and derivatives, alcohols, phenol, acetone and MEK, vinyl monomers (including acrylates), polyamide precursors, polyester precursors, and isocyanates and urethanes. The volumes are separately indexed.

Corrosion and Deposits from Combustion Gases. Abstracts and Index. Edited by J. E. Radway. Hemisphere Publishing Co.: New York. 1986. (Distributed outside North America by Springer-Verlag.) xiii + 575 pp. \$95.00. ISBN 0-89116-301-8.

Corrosion and deposition are serious problems in industries that burn fuel to generate steam, hot water, and power; boiler tubes and turbine blades are susceptible. This volume is an organized collection of abstracts on the subject. The index of no less than 188 pages is an important feature for maximizing the usefulness of this collection.

Sampling of Powders and Bulk Materials. By Karl Sommer. Springer-Verlag: Berlin and New York. 1986. x + 291 pp. \$39.00. ISBN 0-387-15891-X.

Sampling is the process of taking a representative portion of a material for the purpose of estimating the composition of the whole, and it is obviously of basic importance in applied analytical chemistry in the drug industry, ore assaying, environmental monitoring, etc. This book treats the sampling of powders and granular mixtures from theoretical and practical viewpoints.

Dewpoint Corrosion. Edited by D. R. Holmes. Ellis Horwood: Chichester (distributed by John Wiley & Sons: New York). 1985. 292 pp. \$71.95. ISBN 0471-20203-3.

Dewpoint corrosion occurs when gases from combustion are cooled to the point of partial condensation. It is a matter of concern in heating systems, flue-gas desulfurization, automobile exhausts, etc. This book treats the subject in 16 chapters developed from an international conference held in London in 1985.

Gas Flow in Nozzles. By U. G. Pirumov and G. S. Roslyakov. Springer-Verlag: Berlin and New York. 1986. x + 424 pp. \$59.00. ISBN 0-387-12413-6.

This book contains a general treatment of the gas dynamics of nozzles, presented in terms of modern theory and mathematical methods. The treatment includes attention to the physical chemical aspects of engine exhaust and thermal power plant generators.

Energy and Resource Quality: The Ecology of the Economic Process. By Charles A. S. Hall, Cutler J. Cleveland, and Robert Kaufmann. John Wiley & Sons: New York. 1986. xxiv + 577 pp. \$47.50. ISBN 0471-08790-4.

The basic resources of natural and industrial systems and their interaction with energy are the focus of this book. It includes chapters on Energy and Economics, U.S. Energy Resource Systems, Environmental and Human Health Impacts, and Management of Renewable Natural Resources.

The Compendium of Safety Data Sheets for Research and Industrial Chemicals. Edited by Lawrence H. Keith and Douglas B. Walters. VCH Publishers: Deerfield Beach, FL. 1985. 1862 pp. \$270.00 (3-volume set). ISBN 0-89573-313-7.

These three volumes present data on a large group of compounds, taken up in alphabetic order, with two pages per compound. Physical properties, D.O.T. shipping information, hazards, toxic symptoms, exposure limits, treatment of injuries, storage precautions, and clean-up recommendations are given. It is a most useful compilation. Access to desired data is made easier by indexes of names and of CAS Registry Numbers, but there is no formula index. Although the names used are those most widely used by chemists, and many synonyms are given, there still may be difficulties, because CAS index names are not given if they do not correspond to general use. For example, butylamine and 1-aminobutane are listed, but that nomenclatural stepchild, butanamine, is not to be found. Perhaps it is just as well.