Book Reviews*

Chemistry of Pesticides. Edited by K. H. Buchel (Bayerwerk). John Wiley & Sons, New York. 1983. xii + 518 pp. $90.00.

The Publisher describes "Chemistry of Pesticides" as "a concise survey of the significance, structure, synthesis, use-pattern and chemical and biological properties of all important commercial agro-chemicals...An indispensable reference for the specialist in the field, *Chemistry of Pesticides* also serves individuals in universities, agriculture, business and government who are involved in the global problem of pest control". The book partially lives up to these claims.

The major thrust of the book is, as the title says, chemistry: structures and syntheses. This coverage is well supplemented with references and dates of introduction into use. Also discussed are use patterns and modes of action although indications of relative activity (e.g., rates of application in the field) are, for the most part, lacking. The most comprehensive of these discussions is for the organophosphates, but considering the survey nature of the book they are reasonably well done for other pesticide classes as well. In addition an indication of acute mammalian toxicity for nearly every compound described is provided. Another useful feature is the many tables summarizing structure, use, toxicity, references, and other data for related chemicals. And there is also a short chapter on the oft neglected but very important area of formulations.

The index has been nicely divided into four groups: general; classes of agents; individual compounds and trivial names; trade names, common names, etc. In my checking, the indexes seemed generally accurate, although there were occasional mistakes which could lead one astray. For example, Ambush and Pounce trademarks for permethrin appear in the table on page 14. Pounce, however, is missing from the index and the index for Ambush leads the reader to the wrong compound—Aldicarb.

Overall "Chemistry of Pesticides" has done a good job in surveying the field up to about 8 years ago. Up to that point it is a good introduction. The critical shortcoming of this book is that it is out of date, and this is particularly dismaying given the copyright date and the publishers claim that the volume is an updated translation of the 1977 German edition. For example, the new generation of post-emergent grass killers is virtually unmentioned. Only Hoelon is given a passing comment, more as a curiosity compared to other phenoxies such as 2,4-D. Missing are the wealth of related diphenyl ether herbicides that have come since. Also missing are the dimedone-like compounds such as alloxydim sodium, which have similar biological activity. Glyphosate is another compound given only a passing mention with no indication of its rather considerable economic significance. The insecticide acephate is described without any mention of its trade name Orthene. There are insecticides listed as used in this country but which are now banned. Those using this volume as a handbook would be well advised to cross check with more current work.

In summary, while I am impressed by the organization and scope of "Chemistry of Pesticides", its value, especially considering the rather high price of the book, is strongly diminished by not being more up to date.

Rawls Frazier, *Chevron Chemical Company*

Organic Synthesis: Concepts, Methods, Starting Materials. By J. Fuhrhop and G. Penzlin (Universität Berlin). Verlag Chemie, Weinheim, FRG, and Deerfield Beach, FL. 1983. XI + 355 pp. $39.00.

This book should be a welcome addition to the library of any student of organic chemistry interested in research at or above the graduate level. It attempts not to teach comprehensively all aspects of organic synthesis, but rather to describe, in outline, the main points of a number of current ideas on the subject and to then give references from which a more solid background can be obtained. This approach appears to work very well, and all four main points of the book, "the synthon approach, retrosynthetic analysis, functional group interconversion and complex molecule synthesis" are described well enough for the reader to understand and practice these techniques. In addition, the synthetic routes concentrate on those using currently favored reagents, with cost and availability being highlighted. One of the unusual features of the book is a table of commercially available reactants arranged primarily according to functionality. How useful such a compilation will be with chemical catalogues available to most researchers is open to debate; however, the concept is interesting and deserves to be tried. In conclusion then, the authors have used their experience in previous successful publications to produce a book which bridges the gap between organic chemistry taught at the undergraduate level and chemistry practiced in the research laboratory. The book is well written, with potentially difficult concepts described in a clear and concise manner. I would recommend this book to anyone actively involved in organic synthesis.

Alan R. Morgan, *University of Toledo*

Total Synthesis of Natural Products: The "Chiron" Approach. By Stephen Hanessian (University of Montreal). Pergamon Press, Oxford and New York. 1983. xvii + 291 pp. $20.00.

Carbohydrates are a readily available source of chiral carbon compounds. Their compact and highly functionalized nature in concert with their stereochemically and conformationally distinguishing characteristics make them prime targets for exploitation by the synthetic chemist. This monograph presents a unifying strategy for the synthesis of natural products from optically active starting materials and illustrates it with extensive examples from the literature. Although terpenes, amino acids, hydroxy acids, etc. are briefly considered, the major emphasis is on the use of carbohydrates as building blocks.

Early chapters involve the retrosynthetic analysis of target molecules. A number of chiral centers are located, and the target is dissected in such a way as to cause minimal disruption of these centers. In this way, "chiral synthons" or "chirons" are generated. The "chirons" are then assembled from an appropriate starting material ("chiral template"). Guidelines for locating various kinds of "carbohydrate-type symmetry" are delineated.

The majority of the monograph is concerned with the execution of this process. Numerous examples of carbohydrate-based natural product syntheses are presented, each accompanied by a discussion of the retrosynthetic strategy and a description of the actual synthesis. Almost every example is accompanied by an excellent flow chart which presents the retrosynthetic analysis followed by the synthesis proper, including conditions. The coverage is extraordinarily complete, with over 150 schemes and 500 references. The examples are organized into three major categories: those targets where the "carbohydrate portion" is apparent (tetrahydropyrans, tetrahydrofurans, valerolactones, etc.), partially hidden, or hidden (prostaglandins, heterocycles, macrolides, etc.). A final chapter addresses the possible role of the computer in target dissection.

Aside from the value of the "chiron" approach to synthetic design, this monograph should prove very useful as a reference source for the synthetic organic chemist. The extensive coverage of carbohydrate-based natural product syntheses, the highly visual presentation, and the well-referenced nature of the book are excellent.

William H. Pearson, *University of Michigan*

Developments in Ionic Polymers. Volume 1. By A. D. Wilson and H. J. Prosser (Laboratory of the Government Chemist, Cornwall House). Applied Science Publishers, Essex, England, and Elsevier Science Publishing Co., New York, NY. 1983. ix + 336 pp. $63.00.

This book offers an excellent review of organic and inorganic ionic polymers that is suitable for practitioners and newcomers to the field. The wide range of ionic polymers examined include borophosphate and aluminophosphate glasses, carboxylated and sulfonated elastomers, polyacrylate and polymethacrylate salts, polyelectrolyte cements, ionic polysaccharides, and polyelectrolyte complexes.

In the first chapter, Wilson and Prosser classify the various types of ionic polymers and relate the range of properties of ionic polymers to structure. This chapter also contains a brief description of the energetics of ion binding. In Chapter 2, N. H. Ray describes the preparation and properties of oxide glasses. In Chapter 3, R. Longworth updates his earlier review in Ionic Polymers published in 1973. He explores the properties of thermoplastic ionic polymers using differential scanning calorimetry and dynamic mechanical analysis. He uses dynamic mechanical analysis, specific conductivity, dielectric relaxation, and dynamic viscosity data to correlate the behavior of the polymers with molecular structure. He also reviews X-ray diffraction and neutron scattering evidence for the existence of ionic clustering and phase separation.

In Chapter 4, W. C. Forsman presents an excellent description of the development of ion association theory for ionomers and a model for ion-pair clustering formation based on statistical mechanics which relates cluster formation to changes in chain dimensions. In Chapter 5, Prosser and Wilson describe the preparation, properties, and applications of polyelectrolyte cements. In Chapter 6, D. Reid describes the animal, plant, and synthetic origins of ionic polysaccharides and presents models for the structures of dilute and concentrated solutions of these materials.

*Unsigned book reviews are by the Book Review Editor.

In Chapter 7, A. Veis presents theoretical approaches designed to describe systems of complexes formed between polymers containing ionic functional groups distributed along the polymer chains and focuses on the formation of two liquid phases in equlibrium from solutions of hydrophilic polymers with opposite charges.

Malcolm B. Polk, *Atlanta University*

Hydrazine and Its Derivatives: Preparation, Properties, Applications. By Eckart W. Schmidt (Rocket Research Company, Redmond, Washington). John Wiley and Sons, New York. 1984. xxv + 1059 pp. $85.00.

The author set for himself the monumental objective of summarizing the enormous amount of information on hydrazine and its simpler organic derivatives contained in the published literature. In the opinion of the reviewer, the author has admirably succeeded in this objective. The chemistry of hydrazine, as well as pertinent engineering aspects of hardware in which hydrazine is being used for rocket propulsion and gas generation, receives attention. Methods of manufacture, analytical procedures, and chemical and physical properties are summarized. The more important reactions of hydrazine are included. A special chapter is devoted to catalysts for the decomposition of hydrazine. Although the book gives much emphasis to the applications of hydrazine as a rocket propellant, nonrocket applications of hydrazine and its derivatives are not ignored. Understandably, the author has had to set some limitations on his monumental task, and complete coverage of organic derivatives of hydrazine was not attempted; however, much information on monomethylhydrazine and the dimethylhydrazines is included. The list of chapter titles follows: Production of Hydrazine; Physical Properties of Hydrazines; Hydrazine Chemistry; Hydrazine Handling; Hydrazine Decomposition and Combustion; and Hydrazine Applications. The list of references is unusually complete and occupies a total of 195 pages. In the opinion of the reviewer, no chemist in this or a related field can afford to be without ready access to this volume.

Harry H. Sisler, *University of Florida*

The Alkaloids. Volume 13. A Specialist Periodical Report. Senior Reporter: M. F. Grundon. The Royal Society of Chemistry, London. 1983. XII + 331 pp. 33.00 ($59.00).

Volume 13 of the series covers the entire field of alkaloid chemistry, including isolation, biological activity, synthesis, and biosynthesis. The book, which covers the literature between July 1981 and June 1982, is divided into chapters according to classical alkaloid classification. In addition to the first chapter which outlines advances in the area of biosynthesis, there are fifteen chapters devoted to the various classes of alkaloids, each of which is divided into detailed sections. Volume 13 presents a 2-year coverage of *Lycopodium* Alkaloids, which was omitted in the 12th volume. Isoquinoline and indole alkaloids are covered and referenced extensively in Volume 13, with some 102 pages devoted to these areas.

As usual, the organization of the book is excellent, and the chapters are uniformly well written. Liberal use is made of reasonably detailed synthetic schemes throughout the volume. The major differences in Volume 13 compared with prior volumes are mainly cosmetic. As a concession to "rising costs", the format of the book has been changed from typeset to photooffset and an alternative means of producing chemical structures (introduced in Volumes 10 and 12) has been employed. Although these changes do not affect the content, the overall result is not as pleasing as in earlier volumes. Volume 13 will also be the final yearly review in the series, being replaced by a bimonthly review journal, "Natural Products Reports".

To any organic chemist interested in natural products chemistry, the volume is invaluable. Hopefully, the new journal presentation will be as useful and well constructed as the annual volumes.

Steven P. Tanis, *Michigan State University*

Traceable Temperatures. By J. V. Nicholas and D. R. White (New Zealand Department of Scientific and Industrial Research). DSIR Science Information Division, Wellington, New Zealand (DSIR Bulletin 234). 1982. 226 pp. New Zealand $21.00.

As used in this book, "traceable temperature" means that a measurement made with a particular thermometric device in the lab or plant can be associated with, or traced to, a thermodynamic (or Celsius) temperature as defined by the authorized international agency and that the association or tracing, perhaps through intermediate calibrations, is properly documented so that one can state what temperature the original measurement indicates, along with a reasonably well established extent of uncertainty for that temperature. While there is necessarily some overlap, the authors deal primarily with "traceability", rather than with "high-precision measurement", of temperature. Nicholas and White are affiliated with the organization responsible for national measurement standards in New Zealand; they appear to have had considerable practical experience in the topics they discuss.

The most common thermometric devices are liquid-in-glass thermometers, thermocouples, and (platinum) resistance thermometers. The use, calibration, and care and maintenance of each of these is discussed in sufficient detail for an interested, intelligent novice to become proficient with these devices. The final 11-page chapter discusses, very briefly, other types of temperature sensors, e.g., thermistors, optical pyrometers. An appendix lists, with addresses, 27 national laboratories responsible for maintenance of national measurement standards including temperature, e.g., the U.S. National Bureau of Standards.

This book is not intended to be a treatise on temperature and its measurement. It is more of a guide or handbook for persons immediately responsible for reliable temperature measurement. For such persons, who could be graduate students or plant supervisors, the book should be very helpful.

Robert D. Freeman, *Oklahoma State University*

Guide to the Chemical Industry. By William S. Emerson. John Wiley & Sons, New York. 1983. xvi + 330 pp. $35.00.

This book attempts to treat, in a thin volume, the complete spectrum of information needed by a newcomer to the chemical industry: processes, products, research and development tactics and stategy, management, corporate organizations, market development, and career planning. It should not be news that at least an introduction to all of these topics is needed by all chemistry students and teachers.

Unfortunately, "Guide to the Chemical Industry" is probably not the solution to that problem. Although the author has made an admirable effort to treat such a broad range of subjects, I found the work to be a confusing mixture of good information (some current, some out of date) and misinformation. An experienced teacher or practitioner of industrial chemistry can find some useful insights during a critical reading of this book, but it cannot be recommended as a primary information source or textbook.

Gerald L. Goe, *Reilly Tar & Chemical Corporation*

Teoria Orbitalica de las Reacciones Quimicas (Orbital Theory of Chemical Reactions). By J. Castells (Universidad de Barcelona, Spain). Alhambra, Madrid. 1983. x + 219 pp.

This volume was designed to be used as a textbook for graduate students in Oganic Chemistry. Its aim is to provide the student with a better understanding of organic reactions by applying molecular orbital perturbation theory. This book is not overly burdened with an excessive number of complicated mathematical expressions; instead, the author is most concerned with the application of the theory to the interpretation of reactions which the student is likely to encounter from his first day in the laboratory (substitution, elimination, Diels–Alder, etc). Along this line, most chapters contain a set of exercises, sometimes accompanied by a list of pertinent references. A list of 40 general references is found at the end of the book.

Unfortunately, the scope of the book is not as broad as its title might lead one to believe. Thus, only thermally induced reactions are discussed, while photochemical processes are notably absent. The following topics are covered in detail: reactions which involve one pair of electrons, ionic reactions which involve two or three pairs of electrons, and concerted reactions which involve two or three pairs of electrons.

Overall, this is a well-written and well-organized book which will undoubtedly be useful to thousands of students all over the world, just as long as they can read Spanish.

Juan C. Jaen, *Warner-Lambert/Parke-Davis Pharmaceutical Division*

Organic Electrochemistry: An Introduction and a Guide. Second Edition. Revised and Expanded. Edited by Manuel M. Baizer (University of California Los Angeles and University of California Santa Barbara) and Henning Lund (Aarhus University, Denmark). Marcel Dekker, Inc., New York, NY. 1983. XVIII + 1166 pp. $155.00.

This is a fine book on the use of electrochemistry to effect transformations of organic substances. It is an excellent starting point for anyone wishing to explore the application of electrochemical technique to organic chemistry and at the same time it provides a comprehensive up-to-date review for researchers in the field. The topics covered include basic theory and methods (with some example procedures given). The chemistry presented is arranged by functionality and also reaction type (oxidative coupling, reductive coupling, cleavage, anodic substitution, anodic fluorination). Synthetic and mechanistic considerations are nicely set forth. An interesting review of indirect Electrooxidation and Reduction methods is given, including amalgam reductions, electrogenerated reagents, and the use of solvated electrons. The stereochemistry of organic electrode processes and industrial applications of electrochemistry is also found in this book.

This volume coupled with N. L. Weinberg's review on "Technique of Electroorganic Synthesis" afford one a very complete presentation of current electroorganic chemistry.

Leon Mandell, *University of South Florida*

Advances in Infrared and Raman Spectroscopy. Volume 10. Edited by R. J. H. Clark (University College, London) and R. E. Hester (University of York). John Wiley & Sons, New York. 1983. xv + 454 pp. $110.00.

This volume contains six chapters covering areas of spectroscopy which should be of general interest to chemists. Each chapter is accompanied by an extensive list of the pertinent literature references.

Chapter 1, by A. J. Downs and M. Hawkins, is devoted to Raman studies of molecules in matrices, with discussions of the experimental techniques and the increasing number of applications of Raman spectroscopy to the characterization of species in matrix environments. The second chapter is a succinct description by G. A. Kearley and I. A. Oxton of recent vibrational studies of the ammonium ion in crystals. Their emphasis is on hydrogen bonding, phase transitions, and orientational barriers. Chapter 3 by J. Marshall deals in detail with the hazards to eyes and skin posed by laser radiation. Exposure limits and safety standards are discussed.

V. Schettino and S. Califano present in Chapter 4 a review of selected results on the infrared and Raman spectra of molecular crystals. They discuss the problem of lattice dynamics and the application of vibrational models, both harmonic and anharmonic, to the calculation of frequencies and intensities. Chapter 5 by P. R. Griffiths traces recent developments in Fourier transform infrared instrumentation and presents useful comparisons of the optical and data systems of the several commercial spectrometers. The final chapter (C. G. Cureton and D. M. Goodall) is a 118-page review of the advances in vibrational photochemistry of the past 2 years. Both single photon and multiphoton processes are treated, along with examples of unimolecular and bimolecular reactions in vapor, liquid, and matrix phases. Special attention is given to isotope separation processes.

This volume continues the high quality and utility of the series.

Eugene R. Nixon, *University of Pennsylvania*

Polar Covalence. By R. T. Sanderson (Arizona State University). Academic Press, New York. 1983. xii + 240 pp. $19.50.

Quantum-chemical calculations of spectroscopic accuracy are still out of reach, except for ridiculously small systems. Therefore there is still room in chemistry for semiempirical "schemes". The most recent schemes are computer based: all-valence electron approximate molecular orbital algorithms (Pople, Dewar, et al.), classical algorithms interfaced to a modicum of quantum mechanics (packing calculations, molecular mechanics, consistent force fields, etc.). In "Polar Covalence", Professor Sanderson uses algebra, not computers; he restates his life-long, pedagogical approach to bonding in chemistry and updates themes from his previous books. In a minor key, Sanderson's scheme is in the great tradition of Linus Pauling's "The Nature of the Chemical Bond". Its simplicity challenges me to compress its essence into this space.

Sanderson starts with experimental data for 39 chemical elements: single-bond covalent radii r_j (pm) from crystallography, and single-bond energies E_j''' (kcal/mol) inferred from thermochemistry; when lone pairs of electrons are present, the E_j''' are reduced to the "weakened" E_j' values, again inferred from experiment. Sanderson's scale of "relative compactness" electronegativities S_j reflects the ability of a sphere of uniform charge density to attract an extra electron; in its present form it is close to the Pauling and Allred–Rochow scales, except for the alkali metals. For the halogens F, Cl, Br, and I S_j = 4.000, 3.475, 3.219, 2.778 are chosen: these numbers are close to $0.32 + 1.7E_j'''(n - 0.70)/r_j$, where n = highest occupied principal quantum number. From the halogen S_j, Sanderson picks S_k values for most other elements by requiring $S_k r_k^3 = S_j r_j^3$. However for H, Li, N, Na, K, and Ca S_k = 2.592, 0.670, 3.194, 0.560, 0.445, 0.946 are chosen. From these data, plus experimental interatomic distances, Sanderson sets out to explain the energetics of gas-phase molecules and crystals. For instance, in KBr(gas) the free atom electronegativities S_K = 0.445 for K and S_{Br} = 3.219 for Br are equalized, i.e., replaced by their geometric mean 1.197. This *principle of electronegativity equalization* in chemical bonding has received renewed careful attention by R. G. Parr, P. Politzer, and their co-workers. The partial charges are $\delta_K = (S_{Br}^{1/2} - S_K^{1/2})/1.57 = 0.718$ and $\delta_{Br} = -0.718$, and ionic and covalent blending coefficients $t_i = 0.718$ and $t_c = 1 - t_i$ are obtained. The experimental bond distance in KBr(gas) is R_o = 282.1 pm, whereas the atom radius sum is R_c = 310.4 pm. The pure covalent energy of KBr is $E_c = (R_c/R_o)(E_K'''E_{Br}')^{1/2}$; the pure ionic energy is $E_i = 33207/R_o$. The total energy is not $E_c + E_i$, but the *weighted sum* $t_cE_c + t_iE_i$: this is what Sanderson means by "*polar covalence*". For KBr the calculated $t_cE_c + t_iE_i$ = 92.1 kcal/mol is very close to the experimental 91.5 ± 2 kcal/mol. In more complicated molecules, arithmetic and geometric means are taken as needed. For double and triple bonds the energies are multiplied by 1.488 and 1.787, respectively. In solids, E_i becomes $33207fz_jz_kM(1 - 1/m)/R_o$, where M is the Madelung energy, z_j and z_k are the formal anion and cation charges, m is the Born repulsion correction, and f is an unfortunate fudge factor (1.00 for halides, 0.644 for oxides, 0.732 for alkali metal sulfides, etc.); E_c gets multiplied by a puzzling factor of 4 (or 3 for Li, Na, Be, and Mg halides).

Sanderson applies these techniques to obtain remarkably good agreement between his calculated values and thermochemical heats of formation, or, as he prefers, atomization energies. He also obtains a wealth of partial atomic charges. Most of his results are chemically reasonable and reward his industry. There are puzzles, however: problems with the hydrides and alkali fluorides are ascribed to "polarizability" effects; for CF_4 agreement with experiment is reached only if the C–F bond is 75% on the way to "fully weakened". In the old problem of understanding the energy systematics in branched alkanes, Sanderson is led to a hierarchy of C–C bond energies that depend on whether the carbons are linked to other carbons or to H. Since all measurements of partial charges are at present indirect, it is hard to dispute the reasonableness of Sanderson's (or anybody else's) partial charges (which differ from the Mulliken population analysis charges, or from the electrostatic potential-derived charges). The book is, alas, marred by poor proofreading.

All in all, Professor Sanderson has developed an interesting, old-fashioned, but surprisingly effective, insight into structure and bonding. His book and his message deserve a place in undergraduate (or even beginning graduate) courses in inorganic and organic chemistry.

Robert Melville Metzger, *The University of Mississippi*

The Chemistry and Biology of Antibiotics. By V. Betina (Slovak Polytechnical University). Elsevier Scientific Publishing Company, Amsterdam and New York. 1983. 590 pp. $125.00.

This book, Volume 5 of the "Pharmacochemistry Library" series, ambitiously addresses a wide range of topics which should be of interest to chemists, pharmacologists, microbiologists, and molecular biologists. There are 15 chapters, subdivided into over 250 smaller sections. There are chapters dealing with nomenclature, screening methods, identification, and classification of antibiotics, various aspects of antibiotic biosynthesis (including regulation of production), structure–activity relationships, and applications of antibiotics (including mechanisms of action, resistance, and applications to molecular and cellular biology). Considering the wide range of subjects and the relatively limited size of the book (some 510 pages of text printed in a rather large type size), no one topic is covered in great depth; nevertheless, thorough referencing should greatly enhance this book's utility. The most recent of the more than 1500 papers cited were published in 1980. Regrettably, there are indices of neither authors nor organisms.

A cursory perusal for errors quickly turned up the following passage from the biosynthesis chapter: "If radioactive isotopes, such as ^{14}C, ^{15}N and ^{35}S, were present in the precursors, their presence in the antibiotic and its degradation products can easily be established". Betina's inclusion of ^{15}N and omission of ^{3}H regrettably arouses one's skepticism.

While not an encylopedic source of information in itself, this book would seem to satisfy the need for a general reference on the title subject. On the other hand, one would hope to obtain a good deal more for the rather exorbitant price.

John M. Schwab, *The Catholic University of America*

International Tables for Crystallography. Volume A. Space-Group Symmetry. Edited by Theo Hahn. D. Reidel Publishing Co., Dordrecht, Holland. 1983. XV + 854 pp. $165.00 (institutions); $90.00 (individuals).

This is the first volume of the new and thoroughly revised edition of the "International Tables for X-ray Crystallography", familiar companion to all practitioners and students of crystallography. With over 50% more, and larger, pages, this book represents a substantial extension over its predecessor.

After an initial section on terminology and graphical symbols, there follow two particularly user-friendly sections, Guide to the use of the space-group tables, and Space-group determination and diffraction symbols, including examples and mention of common pitfalls. Sections on space-group symbols and on transformations in crystallography complete the first 80 pages.

The main part of the book covers the 230 space groups in over 600 pages. Each space group is given two pages, or more in cases of multiple settings or origin choices. The use of graphical symmetry diagrams is greatly expanded; typically, views along all three principal axes are included. The confusion of cubic space groups should be greatly alleviated

by the well-conceived symmetry diagrams and two pairs of stereoscopic diagrams given for each. In addition to origin specification and general and special positions, information on Patterson symmetry, asymmetric unit, symmetry operations, subgroups, and supergroups is included for each space group. As an aid to the user, short explanations of these entries are given inside the covers of the volume.

The last section, Symmetry in Crystallography, is more theoretical than the rest of the book; space-group symmetry, crystal lattices, point groups, including noncrystallographic, e.g., icosahedral, symmetry operations, space-group symbols, and lattice complexes are covered in about 140 pages.

The Editor and his international team of contributors can take pride in the result of their 10-year effort. The clear and practical treatment and the added graphics will be appreciated by practicing crystallographers. The easier accessibility to the subject of crystal symmetry means that chemists without crystallographic training can make good use of this book as an aid in extracting structural information from the increasingly terse crystallographic journal literature.

It is a lesson for us all to witness what has become of a subject which, to the contemporaries of Fedorov and Schönflies, long before the discovery of X-ray diffraction, must have appeared as typical "useless research".

Christer E. Nordman, *University of Michigan*

Annual Reports on the Progress of Chemistry. Volume 79. 1982. Section B: Organic Chemistry. Edited by A. G. Davies and P. J. Garrat (University College, London). The Royal Society of Chemistry, London, U.K. 1982. xvi + 356 pp. $114.50.

This Section follows the same pattern as the Reports of previous years, providing a consise summary of the major advances in 1982 in the very diverse areas that today compose the field of Organic Chemistry. Topics reviewed range from advances in physical methods for structure elucidation, with a Chapter devoted entirely to NMR spectroscopy, to theoretical chemistry, that has dealt mainly with the use of ab initio methods in chemistry. Electroorganic chemistry, a subject of steady growth for the past few years, and photochemistry, concerned with reactions that have potential for either organic synthesis or solar energy conversion, have of course been included in this review. A chapter on enzyme chemistry deals with covalent catalysis and the role of regulatory molecules in the chemistry of enzymes. Other areas reviewed are reaction mechanisms of pericyclic, polar, and free radical processes; chemistry of reactive species such as arynes, carbenes, nitrenes, and silylenes; and synthesis and reactivity of aliphatic and alicyclic compounds, including stereochemical aspects, as well as of aromatic and heterocyclic compounds. Last but not the least in importance are organometallic chemistry and new stereoselective methods of general application in synthetic organic chemistry. Following the tradition established by previous Annual Reports, all the reviewers, or in the Annual Reports terms, reporters, are experts with a deep knowledge of the field they are reviewing. Therefore, reading through the pages in this book will delight all those interested in maintaining an up-to-date view of the progress of organic chemistry. One negative comment is warranted, though. With exception of an excellent author index, no other indexing but the table of contents is provided. In the opinion of this reviewer, the entire readership of these reports would benefit greatly from a complete subject index.

Fernando A. Souto, *University of Puerto Rico—Mayagüez*

The Inorganic Chemistry of Biological Processes. Second Edition. By M. N. Hughes (University of London). John Wiley & Sons, New York, N.Y. 1981. ix + 338 pp. $27.95.

Teaching a course in bioinorganic chemistry at the graduate/advanced undergraduate level can be a frustrating experience. The wealth of subject matter cannot be adequately covered in a one-semester course and there is no suitable textbook. One generally must choose between two alternatives: examination of a limited number of systems in depth in order that the chemical subtleties of each system may be properly understood and appreciated or presentation of a survey of the field, demonstrating its rich diversity but treating no individual system in depth. Neither approach is entirely satisfactory.

This book by Hughes takes the latter approach. After three brief chapters quickly reviewing biochemistry, inorganic chemistry, and spectroscopic and other techniques, the following topics are treated in one chapter each: hydrolytic enzymes; biological redox reactions; nitrogen fixation; dioxygen binding; iron metabolism; biology of Na^+, K^+, Mg^{2+}, Ca^{2+}; metal ions and chelation in medicine; and non-metal trace elements. In the limited space available, no topics are treated in depth although extensive references are given to lead the student to the original literature on each subject. Usually the conclusions of studies of a particular system are given with little discussion of the means by which the conclusions were reached.

I have not found Hughes' text (nor any other text) to be a suitable primary text for a bioinorganic chemistry course. As primary sources, I have instead used review articles, particularly from the several excellent review series on bioinorganic chemistry, and original journal articles. I have assigned Hughes' text as a secondary source, however, since it gives an overview of the entire field and allows each individual topic to be placed in perspective.

Hughes' text is not highly readable and its lack of depth is frustrating. One of its most serious problems is that it does not give the student an appreciation of the experimental approach to solving problems in bioinorganic chemistry. Nevertheless, it can fulfill a useful function in a bioinorganic chemistry course by acquainting the student with topics not otherwise covered in the course and, because of the extensive lists of references after each chapter, it is a convenient book to have on one's shelf.

Joan S. Valentine, *University of California, Los Angeles*

Biochemical Applications of Raman and Resonance Raman Spectroscopies. By Paul R. Carey (National Research Council of Canada). Academic Press, New York. 1982. xi + 262 pp. $34.00.

The rapid growth in the application of Raman and resonance Raman spectroscopies to biochemical problems has created a need for a fundamental sourcebook on the subject. This book fulfills this need by presenting in a single volume the basic principles that underlie Raman spectroscopy together with the requisite biochemical background. Thus, this text is intended for use by biochemists who wish to apply Raman spectroscopy to their research, as well as for seasoned spectroscopists interested in the study of biomolecules. The book is clearly written, very well organized, and succeeds in striking the proper balance between the two aspects of the title subject.

The book is organized into two distinct parts. The first three chapters present in very elementary and lucid terms the theoretical and experimental aspects of Raman spectroscopy. Great care has been taken to define all technical terms and to illustrate all important principles with appropriate examples. The great majority of the book, however, is devoted to a survey of the application of both Raman and resonance Raman spectroscopies to the study of biological molecules. Separate chapters are devoted to proteins, nucleic acids, and lipids, and each includes a concise description of the structures of these classes of molecules. For each subject, the appropriate background material is presented followed by examples of published spectra and procedures for interpretting the data. Emphasis is placed on the abstraction of information relevant to the biological function of the system under study. The author has also included a nice chapter on resonance Raman labels, an area in which his own work has been influential.

This book is a welcome addition to the field and will be most valuable to those not yet versed in *both* the spectroscopy and the biological chemistry. It presents just the right amount of just the right things and, as such, is an excellent investment for anyone interested in this area of research.

Harold E. Van Wart, *Florida State University*

Crystals: Growth, Properties and Applications. Volume 4. Springer-Verlag, New York. 1980. 219 pp. $55.50.

This little volume continues in the high-quality tradition of its predecessors. It contains three separate articles; High Purity Organic Molecular Crystals by Norbert Karl (University of Stuttgart), Rare-Earth Germanates by Ludmila N. Demianets, Anatoly N. Lobachev, and Gennadi A. Emelchenko (Institute of Crystallography, USSR Academy of Science), and Growth, Properties and Applications of Narrow-Gap Semiconductors by Horst Maier and Joachim Hesse (AEG, Telefunken, Republic of Germany).

The article on high-purity organic crystals reviews the methods by which purities of 10^{-7} or 10^{-8} mol/mol may be achieved. The necessity of growing such pure crystals has developed from the requirements to better understand fundamental interactions in the solid state. Such interactions are influenced by impurity levels of as low as 1 ppm. Zone refining is the principal means utilized, and the author discusses the theoretical basis and experimental methods of this procedure in some detail. Other purification techniques such as sublimation, distillation, recrystallization, and column chromatography are also discussed.

Methods of growing large single crystals from the purified material are described. These include Bridgeman techniques as well as sublimation procedures. A number of sublimation methods require very simple apparatus which can be built in almost any laboratory.

Methods of detecting impurities which are treated include elemental trace analysis by gas and liquid chromatography and mass-spectrometric techniques. Less familiar to the reader may be methods based on lifetimes of triplet exitons and free charge carriers or charge carrier trapping and detrapping. Physical defects and preparation of oriented samples are

briefly discussed and the chapter concluded by listing applications which use the purified organic crystals.

Interest in rare-earth germanates stems from their potential use as laser materials, luminophores, radiation detectors, and special glasses and ceramics. The authors classify the germanates into three types, those containing alkali cations, divalent cations, or no secondary cation. The principal structural types are described and illustrated by polyhedral models. The preparation of single crystals is discussed with particular emphasis on hydrothermal methods and presentation of the principal phase diagrams. This chapter concludes with a description of the spectral and luminescence properties of the compounds. Although the language is somewhat stilted and in some places grammatically incorrect, the reader will find this a very useful summary in English of a good deal of material from the Russian literature.

The final chapter concersn the growth, properties, and applications of Narrow-Gap Semiconductors such as $Pb_{1-x}Sn_xSe(Te)$ and $Hg_{1-x}Cd_xTe$. Topics dealt with in some detail include phase diagrams, growth of single crystals and epitaxial layers, and use of these materials in infrared detectors and infrared diode lasers.

Each of the chapters is of high quality, and they serve as useful summaries of large bodies of literature. They can also be read by the novice to serve as an introduction to the respective subjects.

Abraham Clearfield, *Texas A&M University*

Specialist Periodical Report. Carbohydrate Chemistry. Volume 14. Part II. Macromolecules. Edited by J. F. Kennedy. The Royal Society of Chemistry, London. 1983. xi + 542 pp. $155.00.

This volume reviews the literature on macromolecular saccharides that appeared in the year 1980 between the first of January and the end of December. The rapid expansion that recently occurred in the field of polysaccharides has made it impossible to handle a literature review of this group of compounds as well as that of micromolecular saccharides in one and the same volume. Accordingly, Volume 12, and subsequent volumes of this series, have been divided into two parts, with Part II devoted to macromolecules.

Part II of this volume reviews about 3000 references and is divided into eight chapters, whose relative sizes give an indication of the areas that attracted interest during the year under review. A short introduction describes the scope of the work presented and the changes that had to be made in the format of the publication.

This is followed by four short chapters (less than 50 pp), bearing such titles as "General Methods", which deals with new methodologies, particularly chromatographic techniques such as GC, and HPLC, and analytical and structural methods, for example, mass spectroscopy; "Plant and Algal Polysaccharides", which follows covers, starch, fructosan and cellulose, as well as gums and mucilages; "Microbial Polysaccharides", which deals with bacterial and fungal polysaccharides; and "Glycolipids and Gangliosides", which groups these important products according to their origin (plant or animal).

The remaining three long chapters (more than 100 pp) deal with topics that have attracted much attention: "Glycoproteins, Glycopeptides and Animal Polysaccharides", which deals with a subject of importance because of its relation to immunological and other aspects of medicine; "Enzymes", which is another chapter dealing with an area presently undergoing an explosive growth; and "Chemical Synthesis and Modification of Oligosaccharides, Polysaccharides, Glycoproteins, Enzymes, and Glycolipids", which deals with the important developments that have occurred in the synthesis and modification of macromolecular saccharides and the production of new modified polysaccharides, glycoproteins, and enzymes.

This volume, like previous ones in the series, will prove to be extremely valuable to researchers in the saccharide area, whether they be in academe or industry. It is recommended not only for Institutional libraries but for the private collections of individuals. The reporters and senior reporter of Volume 14 should be commended for maintaining the high quality of their publication in the face of the rapid growth in their field.

H. S. El Khadem, *The American University, D.C.*

Advances in Carbohydrate Chemistry and Biochemistry. Volume 41. Edited by R. S. Tipson and D. Horton. Academic Press, New York. 1983. x + 406 pp.

This Volume of the Advances comprises five chapters and an obituary article on J. K. N. Jones, a member of the Birmingham team credited for the synthesis of ascorbic acid in the thirties, who moved to Ontario, where he taught and produced some excellent research work.

Glancing at the table of contents of this volume, one is struck by the number and size of chapters devoted to the rapidly expanding field of Polysaccharide Chemistry. Four chapters deal with this subject, vs. only one (the smallest in size) that deals with monosaccharides.

The first article, by K. Bock and C. Pedersen (Technical University of Denmark), is entitled Carbon-13 Nuclear Magnetic Resonance Spectroscopy of Monosaccharides. It is a followup on an article on the same subject that appeared in Volume 38 of this series. The present paper contains an extremely valuable compilation of carbon-13 NMR data on aldoses, alditols, and aldonic acids, presented in 20 tables, which list chemical shifts and primary bibliographies.

The four articles that follow deal with various aspects of polysaccharide chemistry, beginning with a chapter by E. Barreto-Bergter (Federal University of Rio de Janero) and P. A. J. Gorin (National Research Council, Saskatoon) on the Structural Chemistry of Polysaccharides from Fungi and Lichens. It deals with homopolysaccharides such as α- and β-linked glucans, mannans, and galactan and heteropolysaccharides having mannans or galactans as their main chain. It should be noted that many of the structural elucidations discussed were deduced from the carbon-13 NMR spectra of these polysaccharides by comparing the observed chemical shifts with those of monosaccharides.

The Biosynthesis of Cellulose is then discussed in an article by D. P. Delmer (Michigan State University). After a short survey of the organisms, and the cytological aspects which are useful in understanding this problem, the author discusses in detail the mechanism of polymerization, emphaszing the possible involvement of nucleoside esters, lipids, and polymeric precursors in cellulose biosynthesis.

A subject that has recently attracted much attention is Capsular Polysaccharides as Human Vaccines. This is the subject of an article by H. J. Jennings (National Research Council of Canada). It starts with a survey of the structure of some capsular polysaccharides, moves on to relate the immune response during bacterial infection to capsular polysaccharides, and concludes with the use of polysaccharides in developing vaccines and their role in virulence.

The final, and by far the longest, chapter is entitled High-resolution ^{1}H-Nuclear Magnetic Resonance Spectroscopy as a tool in Structural Analysis of Carbohydrates Related to Glycoproteins. This article complements chapters one and two, which emphasize the use of ^{13}C NMR spectroscopy in the structure elucidation of polymeric saccharides. It is well written and well documented (115 literature citations).

This latest volume of Advances, like its predecessors, is topical, well documented, and ably presented. It is a credit to its authors and to the Editors of the series. It is a must in every scientific library and a valuable addition to the personal book collection of carbohydrate chemists and biochemists in academe and industry.

Hassan S. El Khadem, *The American University, D.C.*

Adsorption. By B. J. Oscik. Halsted Press, John Wiley and Sons, New York. 1982. xv + 206 pp. $69.95.

The author states in his Preface that his objective is to provide a monograph which "treats uniformly processes occurring at all kinds of interfaces". Accordingly, an introductory chapter is followed by chapters dealing with Adsorption at the Liquid/Gas Interface, Adsorption at the Solid/Gas Interface, Adsorption at the Solid/Liquid Interface, Adsorption at the Liquid/Liquid Interface, and The Nature of Molecular Interactions in Adsorption.

The book is entirely classical in its approach. Most attention is paid to the development of adsorption principles, starting with the Gibbs adsorption isotherm. Experimental techniques are discussed only briefly, usually as a guide to illustrating application of a given equation. Modern techniques of surface spectroscopy are not considered at all. There are special sections on adsorption from multicomponent solution and ion-exchange adsorption, which reflect interests of the author. References at the end of each chapter guide the reader to additional work. The most recent reference noted was 1976.

All in all, the author seems to have achieved his objectives. The English text (the book was originally written in the Polish language) is well done. Concepts are clearly presented. The book could serve as a text, or ancillary text, for a first course in surface chemistry and should certainly be useful to research workers in this field. The emphasis, in the reference lists, on work done in eastern Europe provides an interesting perspective on the development of our knowledge of adsorption principles and processes.

Tomlinson Fort, Jr., *California Polytechnic State University*

Zinc Enzymes. Volume 5. Metal Ions in Biology Series. Edited by Thomas G. Spiro. John Wiley & Sons Inc., New York. 1983. v + 359 pp. $89.95.

An overview of zinc in biology and biochemistry is given in the introductory chapter by Bert L. Vallee. This chapter is an excellent summary which establishes the framework for the discussions on specific zinc enzymes which follow. Detailed chapters are devoted to zinc enzymes Carboxypeptidase A, Carbonic Anhydrase, Alcohol Dehydrogenase, Alkaline Phosphatase, and RNA and DNA Polymerases. Each chapter is written by specialists studying the enzyme discussed. The final chapter

reviews the chemical mechanisms whereby zinc and other metal ions catalyze reactions of their coordinated ligands.

Each chapter on an enzyme represents a review of that particular enzyme. Amino acid sequence with the invariant positions among the isoenzymes and the active site with the structural orientation are samples of the information included. Thus this volume in the series is particularly useful to students or researchers of zinc in biological systems. The book cites many references for more detailed and in-depth information.

Dorothy W. Hagan, *Children's Hospital of Michigan*

Kirk-Othmer Encyclopedia of Chemical Technology. Third Edition. Volume 24. Edited by M. Grayson and D. Eckroth. John Wiley and Sons, New York. 1984. xxvi + 917 pp. $185.00.

With this volume, which covers subjects from Vitamins to Zone Refining, this edition is completed. The first article, at 226 pp, is virtually a book in itself, as is the article on Water (184 pp). Among other topics included are Waxes, Wine, Wood, Wool, X-Ray Technology, Yeasts, Zinc, and Zirconium. A loose insert contains errata for Volumes 9 to 23. The high quality of this work appears to have been maintained to the end. Completion of such a huge work must leave the editors with a feeling of emptiness, if not exhaustion!

Silicon Reagents for Organic Synthesis. By William P. Weber (University of Southern California). Springer-Verlag, Berlin, Heidelberg, and New York. 1983. xviii + 430 pp. $100.00.

This is the sort of book that will be heavily used, and it is a pity that its price will severely limit personal purchase. The subject has, of course, been reviewed before, most recently by W. Colvin (1981), but in a rapidly developing field such as this, a lot happens in a few years, and this book is about 20% longer. Furthermore, Colvin's book is inclined to disappear from libraries without a trace.

Professor Weber's book is divided into 25 chapters, according to type of silicon reagent (silyl cyanides, azides, etc.) or reaction (Peterson reaction, ionic hydrogenation, etc.). Each chapter has about 100 references. A short but pithy introductory chapter, Fundamental Considerations, puts organosilicon reagents into perspective, pointing out how much of their chemistry can be understood on the basis of the similarity in electronegativity of silicon to hydrogen and the high strength of bonds of silicon with electronegative elements. In each chapter, the types of reactions are reviewed systematically, with enough examples of applications to synthesis to illustrate their usefulness, but not so many as to bury the generalities. All aspects are covered except silylation of OH, NH_2, and SH groups.

It is helpful to find references to commercial availability of specific silicon reagents, as well as critical comparisons of the methods by which they may be synthesized. It is easy to find desired information because the table of contents is detailed, and it is supplemented with an author index and a substantial subject index. A pleasant feature is the use of running heads on the odd-numbered pages keyed to the subsection of the chapter at hand; this makes searching for specific topics especially easy.

The Vapour Pressure of Pure Substances. Selected Values of the Temperature Dependence of the Vapour Pressures of Some Pure Substances in the Normal and Low Pressure Region. Second Revised Edition. By Tomáš Boublík, Vojtěch Fried, and Eduard Hála (Czechoslovak Academy of Sciences, and Brooklyn College). Elsevier Science Publishers, Amsterdam and New York. 1984. vi + 972 pp. $191.50.

This collection of data is reproduced from computer print-out. It presents in formula-index order a group of substances ranging from Argon through a host of complex compounds, organic and inorganic, giving in tabular form the vapor pressures measured at a series of temperatures, the constants for the Antoine equation, and a comparison of the values calculated from it with the experimental ones. References are given for each substance. There is an index of compounds by name.

Solubility of Gases and Solids. A Literature Source Book. Parts A and B. By J. Wisniak and M. Herskovitz (Ben Gurion University). Elsevier Science Publishers, Amsterdam and New York. 1983. xviii + 2070 pp. $288.50.

Except for a 1-page preface and a half-page Guide to Tables, these two volumes consist of tabulated material. Solutes are entered in formula-index order, and following each are listed the various solvents, which may be single substances or mixtures, and reference numbers to literature citations. The citations themselves appear in a massive list at the end of Part B. There are no actual values of solubilities given, but only the references. This work is thus complementary to the IUPAC Solubility Data Project, which gives critically evaluated numerical data for the narrowly defined areas that have so far been covered.

This book is made up of computer print-out, and when one considers that some 15 000 references have been dealt with, one realizes that the authors had no other reasonable recourse. The result embodies a sacrifice of esthetics and ease of reading for the sake of accuracy. Is it too much to hope that eventually computer technology will have advanced to the stage of the Gutenberg printing press and be capable of reproducing both lower case and capital letters, or even become more startlingly modern so as to be able to print subscripts? Then we will be able to rejoice as we behold $LiClO_4$ instead of ClLIO4! Meanwhile, the authors are to be commended on accomplishing an arduous but very useful task.

Heats of Phase Change of Pure Components and Mixtures. A Literature Guide. By A. Tamir, E. Tamir, and K. Stephan. Elsevier Science Publishers, Amsterdam and New York. 1983. xxix + 674 pp.

This is a bibliography in the form of a computer print-out and consists of one large table of substances in formula-index order, containing the empirical formulas and names of substances with reference numbers identified with respect to heats of fusion, sublimation or vaporization, preceded by a long review of the general subject. The list of references contains about 4500 citations, and about 9000 substances are dealt with. For substances not having a specific empirical formula, such as "gasoline", "cellulose", etc., code numbers are used, for which a dictionary is provided. With this work, one has an organized key to the literature on the subject from 1900 to 1981.

Organic Electronic Spectral Data. Volume XIX. Edited by J. P. Phillips, D. Bates, H. Fever, and B. S. Thyagarajan. John Wiley and Sons, New York. 1983. xiii + 1068 pp. $120.00.

This volume reports ultraviolet and visible spectrographic information published in 1977. The traditional format is followed: formula-index order of listing; solvent; absorption maxima; and reference. The simplest compound reported is, surprisingly, methyl bromide, and the most complex is a C_{114} rhodium complex. A typical page contains the data for 10 to 15 compounds. The service of the compilers in making so much information conveniently accessible deserves appreciation.

Books on Applied Subjects

The Art of Abstracting. By Edward T. Cremmins. ISI Press, Philadelphia, PA. 1982. xii + 150 pp. $13.95.

This is a practical guide and analysis for preparing abstracts of articles, proposals, chapters, etc. The scope is general, but there are specific examples and seven appendices. It appears to be a handy work for chemists who write and read.

Mixing in Continuous Flow Systems. By E. B. Nauman and B. A. Buffham. Wiley-Interscience, New York. 1983. xxvi + 271 pp. $43.95.

Contains ten chapters in two groups: Mixing in Time and Mixing in Space. Written as an introduction for practicing engineers and scientists, emphasizing effects important in the design of chemical reactors.

Pulp and Paper: Chemistry and Chemical Technology. Third Edition. Volume 4. Edited by James P. Casey. Wiley-Interscience, New York. 1983. xxx + 596 pp. $75.00.

One of a four-volume set, now composed of contributed chapters, intended to "present the technical side of papermaking from a fundamental viewpoint". It includes chapters on pigment coating, printing, reprography, laminating, corrugating, and reinforcing.

Pesticides: Contemporary Roles in Agriculture, Health, and the Environment. Edited by T. J. Sheets and David Pimentel. Humana Press, Clifton, NJ. 1979. 208 pp. $19.50.

An interdisciplinary selection of eight contributed chapters on the position of pesticides in agriculture and the various consequences, good and bad, of their use.

Colorimetric Chemical Analytical Methods. 9th Edition. By L. C. Thomas and G. C. Chamberlin. The Tintometer Ltd., Salisbury, England; John Wiley and Sons, Inc., New York. 1980. xxxvii + 626 pp. $85.00.

In this edition there are some new tests, and a few unnecessary ones in older editions have been omitted. The tests are in general applied to specific materials, such as slime, sludges, beverages, foods, leather, etc., and are accompanied by detailed directions.

Drinking Water and Health. Volume 5. National Academy Press, Washington, D.C. 1983. xii + 157 pp. $15.95.

Presents brief reviews of the toxicity of 21 compounds likely to be found as contaminants in drinking water, from the acetylcholinesterase inhibitor aldicarb to uranium and asbestos.

Handbook of Fiber Science and Technology. Volume 2. Chemical Processing of Fibers and Fabrics: Functional Finishes. Part A. Edited by Menachem Lewin and Stephen B. Sello. Marcel Dekker, Inc., New York. 1983. xviii + 431 pp. $99.75.

Contains four contributed chapters, which deal with cross-linking of cellulosics and with formaldehyde-containing reactants, finishing with foam, and protection of textiles from biological attack.

Handbook of Fiber Science and Technology. Volume 1. Chemical Processing of Fibers and Fabrics: Fundamentals and Preparation. Part A. Edited by Menachem Lewan and Stephen B. Sello. Marcel Dekker, New York. 1983. xix + 262 pp. $69.75.

This is the start of a five-volume treatise. It contains five contributed chapters on fibers and organic solvents, fibers and aqueous systems, alkali treatment of cellulose fibers, liquid ammonia treatment of textiles, and wool scouring.

Synthèse et Caractérisation des Macromolécules. By Jacques Prud'homme and Robert E. Prud'homme. Les Presses de l'Université de Montréal, Montréal, Canada. 1981. 184 pp. $9.00.

Designed as a laboratory manual for students who already have a basic knowledge of macromolecular chemistry. It is divided into three parts: synthesis, characterization in solution, and characterization of solid properties.

Engineering with Polymers. By Peter C. Powell. Chapman and Hall, New York. 1983. xvi + 318 pp. $49.95 hardbound; $25.00 softbound.

This book was developed out of a course of 20 lectures offered for final-year undergraduate students in mechanical engineering at Imperial College, London. It thus deals with the mechanics and physics of polymers rather than chemistry.

Materials Recovery from Municipal Waste: Unit Operations in Practice. By Harvey Alter. Marcel Dekker, New York. 1983. 280 pp. $49.50.

This book is intended to teach "the principles and operation of some of the tested methods for recovery of materials from mixed municipal solid waste", including metals, glass, and refuse-derived fuel.

Fundamentals of Chemical Reaction Engineering. By Charles D. Holland and Rayford G. Anthony. Prentice-Hall, Englewood Cliffs, NJ. 1979. xiv + 541 pp. $23.95.

Written for the "beginning student in chemical kinetics and chemical reaction engineering", and subdivided into Fundamentals (six chapters), Design (three chapters), and Advanced Topics (three chapters).

Fundamentals of Fluidized-bed Chemical Processes. By J. G. Yates. Butterworths, Woburn, MA. 1983. xiii + 222 pp. $49.95.

Designed for advanced undergraduates, beginning graduate students, and practicing engineers. Covers physics, kinetics, and application. Among the arcane subject headings are "bed viscosity", "riser cracking", and "beyond the slugging region".

A Guide to Chemical Engineering Process Design and Economics. By Gael D. Ulrich. John Wiley and Sons, New York. 1983. viii + 472 pp. $33.95.

A book designed for use as an advanced undergraduate text, emphasizing case studies. Only SI units are used.

Surface Coatings. Prepared by the Oil and Colour Chemists' Association, Australia. Chapman and Hall, London and New York. 1983. viii + 408 pp. $56.00.

In 30 chapters, polymer chemistry is succinctly reviewed as it applies to surface coatings. Monomers, catalysts, initiators, and pigments are identified with chemical structures (nearly all correct), reactions, and pertinent properties.

Development and Control of Dust Explosions. By John Nagy and Harry C. Verakis. Marcel Dekker, New York. 1983. 296 pp. $55.00.

Presents a comprehensive treatment of the subject, beginning with fundamentals, with special concern for industrial and mining explosions.

Gas Tables: International Version. Thermodynamic Properties of Air, Products of Combustion, and Component Gases, Compressible Flow Functions. 2nd Edition (SI Units). By Joseph H. Keenan, Jing Chao, and Joseph Kaye. Wiley-Interscience, New York. 1983. xvi + 211 pp. $37.95.

In this revised edition, one volume has the data in English units, and this volume has them in SI Units. Besides air itself, the major individual components, including the noble gases, are included.

Statistics in Research and Development. By Roland Caulcutt. Chapman and Hall, New York. 1982. 352 pp. $45.00.

Developed from a course of study developed by Statistics for Industry (UK) Ltd. for engineers, physicists, and biologists as well as the chemists who are the primary concern. The approach is described as "problem centered" and "non-mathematical".

Chemical Engineering. Volume 6 (SI Units): Design. By J. M. Coulson, J. F. Richardson, and R. K. Sinnott. Pergamon Press, New York. 1983. xiv + 838 pp. $75.00.

This volume is subtitled An Introduction to Chemical Engineering Design, and it contains 14 chapters plus seven appendices and author and subject indexes.

Safety Problems Related to Sodium Handling in Liquid Metal Fast Breeder Reactors and Large Test Facilities. Edited by H. M. Kottowski. Harwood Academic Publishers, New York. 1982. 251 pp. $38.00.

Contains the nine contributed lectures from a course given in 1980 at the Joint Research Centre of the Commission of the European Communities.

Technology and Manufacture of Ammonia. By Samuel Strelzoff. Wiley-Interscience, New York. 1981. xxii + 283 pp. $60.00.

Written to help train engineers in the design, erection, and operation of synthetic ammonia plants.

Synfuels: The Problems and the Promise. By E. J. Hoffman. Energon Co., P.O. Box 1352, Laramie, Wyoming. 1982. vii + 347 pp. $29.50.

This book is a broad-ranging series of essays in which synthetic fuels are compared with each other and with other forms of energy production, such as nuclear energy, biological sources, coal and petroleum, and the sun. The problems that arise from the interplay of politics, economics, and social matters are given prominence, and the final chapters give outspoken conclusions and predictions, intended to be controversial. There are no references as such, but there is a 10-page bibliography of books, which includes such works as Spengler's "Decline of the West".

Practical Quality Management in the Chemical Process Industry. By Morton E. Bader. Marcel Dekker, New York. 1983. 160 pp. $27.50.

Said to be the first book on quality programs for the chemical process industries, this book incorporates some material previously published in "Chemical Engineering". It is intended not only for engineers but also for plant laboratory managers and members of corporate staff.

Enlargement and Compaction of Particulate solids. Edited by Nayland G. Stanley-Wood. Butterworths, Woburn, MA. 1983. x + 294 pp. $59.95.

The topics in this book range from characterization of particles and mixing of powders to fluidized beds and the making of tablets. The subject is traced back to Sir Isaac Newton, who observed that "the parts of all homogeneal bodies which fully touch one another stick together very strongly".

Too Hot to Handle: Social and Policy Issues in the Management of Radioactive Wastes. Edited by Charles A. Walker, Leroy C. Gould, and Edward J. Woodhouse. Yale University Press, New Haven. 1983. xiii + 209 pp. $5.95 softbound; $20.00 hardbound.

Consists of seven contributions on social and policy issues, each with references.

Prudent Practices for Disposal of Chemicals from Laboratories. National Academy Press, Washington, D.C. 1983. xii + 282 pp. $16.50.

Although this is a book on an applied subject, it is highly relevant to fundamental research. It is filled with recommendations, from the general one to reduce the scale of experiments to specific methods for destroying particular materials, such as aromatic amines, nitrosamines, methyl ketones, etc. Nearly half the book consists of appendices, one of which presents EPA and RCRA regulations. This book belongs in all research institutions.

Urea–Formaldehyde Resins. By Beat Myer. Addison-Wesley Publishing Co., Reading, MA. 1979. xi + 423 pp. $29.50.

Deals with the chemistry, manufacture, analysis, toxicity, properties, and applications on an interdisciplinary basis.

Industrial Heat Exchangers: A Basic Guide. By G. Walker. Hemisphere Publishing Corp., New York. 1982. 408 pp. $41.50.

The writing of this book was motivated by the rapidly increasing importance of heat exchangers in the chemical and other industries as a means of conserving energy. It is intended for "buyers and users of heat exchangers and for young engineers".

Cotton Dust: Controlling an Occupational Health Hazard. By Joseph G. Montalvo, Jr. American Chemical Society, Washington, D.C. 1982. x + 341 pp. $39.95.

Contains twenty contributions in four areas: ASHA Standard; Engineering Controls and Measurement; Etiology and Epidemiology; and Analysis. Some contributions are reviews and others are accounts of original research.