The program is designed to work in conjunction with a word processor, with a pop-up mini-program supplied, in two versions, to allow the searching of the database and insertion of references without leaving the word processor. The larger of the two pop-ups, which provides for references to be added to the main database or edited, will not work with a large word processor, unless the computer has extended memory. I was able to load and use the larger of the pop-ups in conjunction with XYwrite with a computer having 1 megabyte of RAM, but I ran out of memory when I tried to open a second document simultaneously. The program can be specifically set up to work with Microsoft Word, Wordperfect, Wordstar, and PC-Write, although I used it with XYwrite with little problem. However, with an unsupported word processor, the bibliography must be printed from Papyrus, rather than from the word processor, unless you want to add all the underlines, bold faces, etc. to the bibliography file after you read it into the word processor. I assume that any word processor that writes ASCII files without strange formatting characters should give no more trouble than that.

There are several thoughtful little features in Papyrus. If you begin to enter a reference that is similar to one already in the database, it shows the first reference and inquires if it is the same one and if you wish to continue. It also checks such things as capitalization of authors names and remembers what journals you have entered before, so you can just give an abbreviation the next time. It also keeps a dictionary of keywords for searching your database, as well as abstracts or comments on each paper, if you care to enter them.

The major question with such a powerful and specific-purpose program is "Who needs it?" One can certainly keep a decent bibliography using a word processor, but that would not allow sophisticated searches, and it might need hand labor to reformat it if a different journal required a different format for references. A flat file database, though, could do most searching, and a reasonable job of reformatting. However, it would not supply the instant response inside your word processing program to tell you what that reference by Smith and Jones was, insert the footnote marker automatically, and print the bibliographic listing in specified order. This program, I think, will find its niche in active research groups that publish many papers in a variety of journals, with many people contributing references to a common database, and all using it to extract data as needed.

The license agreement for the program, which is not copy protected, coupled with its relatively modest price, makes it practical for a research group, small company, or academic department to use it easily. The purchaser is permitted to develop up to four distinct databases or can purchase a site license if more are needed. There is no limit specified as to the number of computers that can use copies of these databases. The documentation is included on disk, in addition to the printed manual, to make it easy for each user to have a copy. This is the sort of program that can inspire one to finally dispose of those old 3 × 5 index cards and get those references organized at last!

Barbara B. Kebbekus, *New Jersey Institute of Technology*

Book Reviews[*]

Dynamics of Proteins and Nucleic Acids. By J. Andrew McCammon (University of Houston) and Stephen C. Harvey (University of Alabama—Birmingham). Cambridge University: Cambridge and New York. 1988. xii + 234 pp. $42.50. ISBN 0-521-35654-0.

The authors of this book have a long-standing interest and are recognized experts in the field of atomic motions in proteins and nucleic acids. They have written a well-organized book which introduces the reader to the various aspects of internal dynamics in macromolecules.

After reviewing the structural and energetic properties of proteins and nucleic acids and their relationships with the surrounding solvent, the authors present various mathematical models which are used to simulate the different levels of motions allowed in these systems, along with the advantages and limitations of each. The application of these theoretical approaches for the establishment of correlations between structure and function in protein and nucleic acids is illustrated and critically evaluated. This approach ultimately will allow the design of biomolecules endowed of specific activities which can be produced by molecular engineering.

This is a superbly self-contained book which can be understood not only by researchers who wish to gain some insight into the molecular dynamics of macromolecules, but also offers a variety of information and provides an excellent reference source to the scientists already in the field. It is rewarding reading for those of us interested in the structure–function relationships in macromolecules, using either theoretical or experimental approaches.

This book should make a valuable addition to both institutional and personal libraries and is suitable for adoption on a graduate level course list in biophysical chemistry.

Clara Fronticelli, *University of Maryland*

Chromatographic Separations. Analytical Chemistry by Open Learning. By Peter A. Sewell (Liverpool Polytechnic) and Brian Clarke (Neath College). John Wiley & Sons: Chichester and New York. 1988. xix + 335 pp. $29.95 (paperback). ISBN 0-471-91371-5.

This text is one of a 30-volume series in the basics of analytical chemistry written by staff members of the Polytechnic Chemistry Departments in the United Kingdom and designed to train those "who, for a variety of reasons cannot use conventional education courses".

Chromatographic Separations includes the techniques of gas and liquid chromatography, ion exchange, paper and thin-layer chromatography, and size-exclusion chromatography in varying depths of thoroughness in its five chapters. Chapter 1 introduces the several techniques and covers basic terminology, distribution coefficients, and an elementary discussion of sorption mechanisms. The theory of chromatography, particularly that related to retention in column chromatography and in the paper and thin-layer techniques, is presented in Chapter 2 as well as various factors affecting retention. Peak shape, sorption isotherms, column efficiency, band broadening, and resolution are the subjects in Chapter 3, while Chapter 4 covers some aspects of qualitative and quantitative analysis but restricts the qualitative discussion to retention measurements, neglecting the important ancillary techniques, GC/MS, LC/MS, GC/FTIR, etc. Chapter 5 is devoted to classical column chromatography, adsorption column packings, and applications of ion-exchange and size-exclusion chromatography. Fifty-nine pages at the end of the text are devoted to answering self assessment questions raised throughout the volume.

This text is of limited value to the research scientist since no references are given, thus depriving the reader of the opportunity to pursue a topic in greater depth. Also no index is provided making the text of marginal value as a reference. Moreover, such important subjects as detectors, sample introduction methods, choosing the best liquid phase in partition chromatography, programmed temperature operation, and the instrumentation for GC and HPLC are either ignored or considered only briefly. More serious than the few typographical errors noted (e.g., in eq 2.16, page 43, and in the reference to Figure 2.5, which does not exist, on page 54) are more fundamental ones found on page 49, where it is suggested that retention data at different temperatures can be compared using the definition of the specific retention volume, in which V_g is proportional to the reciprocal of column temperature, and the conclusion on page 72 that retention is inversely proportional to the square of the temperature. Both conclusions are incorrect since it is the *logarithm* of the specific retention volume that is proportional to the reciprocal of the absolute column temperature as given by the well-established expression, $\log V_g = -\Delta H_s/2.3RT_c + c$.

In this reviewer's opinion this text is written well below a level desirable for graduate students or research scientists in analytical chemistry; however, it should be of interest to those in other disciplines who desire only an overview of the several chromatographic techniques.

Richard S. Juvet, Jr., *Arizona State University*

Ben Franklin Stilled the Waves: An Informal History of Pouring Oil on Water with Reflections on the Ups and Downs of Scientific Life in General. By Charles Tanford (Duke University). Duke University: Durham. 1989. ix + 228 pp. $38.50. ISBN 0-8223-0876-2.

The author, an emeritus professor of physiology, has written this account of a simple and insightful experiment by Benjamin Franklin, the

[*]Unsigned book reviews are by the Book Review Editor.

events leading to it, and the experiment's ramifications on biochemistry right up to the biological research frontier. Franklin poured a teaspoonful of oil on an English pond and observed how it spread to form a thin film, and the films's effect on smoothing the waves. This experiment was sparked by Franklin's reading of Pliny's *Natural History* and subsequent observations of the effect of oil thrown from ship's galleys on the sea. Franklin's account of this experiment was published in *Philosophical Transactions* in 1774. Professor Tanford comments that he has often used this account as a teaching aid to initiate students in modern biochemistry and biophysics.

This book is informative and entertaining. It merits reading and rereading not only by chemists but by many other readers who have some knowledge of chemistry. The scientific details are explained well.

Benjamin Franklin was enormously appealing, not only to his contemporaries, but to the multitudes who know him from his famous autobiography, or just from studying American history. The biographical details pertaining to him in this book are very interesting. The author has used photographs he has taken of places associated with Franklin, including one of the pond where the experiment was performed, to illustrate the text.

The influence of Franklin's experiment on some of the talented investigators who followed him in studying the many facets of the oil-on-water phenomenon, takes up a large part of this book. I found particularly interesting, the story of the research of Agnes Pockels, a German woman with limited formal education. She was inspired by cleaning greasy pots, to develop a device to measure surface tension in 1881 and wrote 14 papers as a result. This is reminiscent of a process for flotation of minerals patented by an American woman, Connie Everson, in the same decade. Mrs. Everson's inspiration came from watching mineral particles float away as she washed her prospector brother's overalls.

David H. Kenny, *Michigan Technological University*

Metalloproteins. Chemical Properties and Biological Effects. Edited by S. Otsuka (Osaka University) and T. Yamanaka (Tokyo Institute of Technology). Elsevier: Amsterdam and New York. 1988. xiv + 572 pp. $236.75. ISBN 0-444-98887-4.

The editors have taken on a laudable but formidable task. Due to the diversity of metalloproteins, a comprehensive reference source could be quite useful for newcomers to the field. However, due to both the breadth of and rapid developments in this field, any up-to-date, comprehensive monograph on metalloproteins would be neither for very long. The editors have chosen a reasonable strategy to overcome the breadth problem: brief vignettes, written by over 50 contributors, are presented on hundreds of individual proteins, enzymes, and metal complexes.

The book is divided into two parts. The first part deals with metalloproteins and enzymes and the second part with biological effects of metal ions. Alkali metals are specifically excluded. The second part makes the title a misnomer, as it includes nucleic acids and carcinogenicity of metal compounds. In addition, the book ends with a chapter on protein fractionation by metal-chelate affinity chromatography. This monograph may serve some useful function as an introductory reference source. The first section collects the vignettes according to individual metals and is reasonably complete, even including a section on selenium. However, glaring inadequacies are apparent, even allowing for the unavoidable anachronism referred to above. For example, a newcomer could easily miss the fact that some superoxide dismutases contain iron and manganese, since these superoxide dismutases are discussed only in the section on copper proteins. Glucose tolerance factor is said to contain chromium, but is inexplicably discussed in the section dealing with vanadium-containing proteins. No mention is made of the involvement of manganese in photosystem II of green plants. The book is particularly weak in the area of active site structures. For example, the [4Fe-4S] cluster in ferredoxins, which is by now a classical structure in the field of metalloproteins, is drawn with some missing bond connectivities. A depiction of the diiron cluster in hemerythrin is not included, even though the currently accepted structure has been available since at least 1982, and adequate space appeared to be available for such a depiction without expanding the text. Instead, the ligands to the iron atoms are listed incorrectly, based on a 1975 reference. Several additional examples could be cited. One gets the impression that several sections of this book were not proofread by independent experts. Any user of this book would be well-advised to follow up the discussion of an individual topic by consulting the recent literature.

Donald M. Kurtz, Jr., *University of Georgia*

Progress in Atomic Spectroscopy: Part D. Edited by H. J. Beyer and Hans Kleinpoppen (University of Stirling). Plenum: New York and London. 1987. xxiii + 514 pp. $110.00. ISBN 0-306-42528-9.

This book is written by physicists and concerns atomic spectroscopy in its purest sense. Little of the book would be of compelling interest to most chemists. The book is composed of 10 chapters by a variety of authors on disparate topics, some of which may be of interest to physical chemists and/or analytical spectroscopists. The chapters include Laser-Microwave Spectroscopy (R. Neumann, F. Träger, and G. zu Putlitz), Collinear Fast-Beam Laser Spectroscopy (R. Neugart), Radiofrequency Spectroscopy of Rydberg Atoms (T. F. Gallagher), Rydberg Series of Two-Electron Systems Studied by Hyperfine Interactions (H. Rinneberg), Parity Nonconservation in Atoms (T. P. Emmons and E. N. Fortson), Energy Structure of Highly Ionized Atoms (B. Edlén), Inner-Shell Spectroscopy with Hard Synchrotron Radiation (W. Jitschin), Analysis and Spectroscopy of Collisionally Induced Autoionization Processes (R. Morgenstern), Near Resonant Vacancy Exchange between Inner Shells of Colliding Heavy Particles (H. Stolterfoht), and Polarization Correlation in the Two-Photon Decay of Atoms (A. J. Duncan).

Most of the chapters are lucid and written for the nonspecialist. The chapters on laser-microwave spectroscopy and inner-shell spectroscopy with hard synchrotron radiation are particularly useful for chemists interested in such spectroscopies. The experimental detail and depth of citation in the chapters are excellent. Even though the other chapters are more exotic, few involve much mathematical detail and all provide a good explanation and more than adequate citation.

Should one's interest run to topics in atomic physics, I recommend the book. This volume will, and should, reside in the library, not on the chemist's shelf. The copy sent for review was missing almost 20 pages, presumably Plenum has better quality control on volumes it attempts to sell.

Raymond J. Lovett, *West Virginia University*

The Kinetics of Environmental Aquatic Photochemistry: Theory and Practice. By Asa Leifer (U.S. Environmental Protection Agency). American Chemical Society: Washington, DC. 1988. xxi + 304 pp. $59.95. ISBN 0-8412-1464-6.

In the Preface, the author indicates that this book "is devoted to the theory and practice for determining photoreaction rate constants and half-lives in aqueous media in sunlight". The book accurately represents this goal, and the author writes in a lucid style. All terms are defined concisely, and equations are developed precisely with rigorous attention to detail. Key references to this rapidly developing field are supplied throughout this book. The book can be used as both a text or a reference book by environmental scientists and engineers regardless of their scientific training. The Introduction itself is a wonderful outline of the text and the methods to be described.

The first five chapters (total of 15) develop the theoretical aspects of environmental aquatic photochemistry, which include physical chemistry, photochemistry, and the nature of solar radiation. These five chapters concisely lay the foundation for the development of experimental photochemical procedures for direct photoreaction methods (Chapters 6–11) and for indirect photoreaction methods (Chapters 12–15) in the environment. The later chapters are intended primarily to be used as a reference source. They are a very good blend of the theory previously developed in the first five chapters with the experimental procedures needed to obtain quality data sets. The chapters on chemical actinometry and indirect photochemical reactions in humic waters are particularly noteworthy. The author writes the chapters (7, 10, and 14) on experimental procedures in a straightforward manner so that little is left to chance. These chapters will allow for the text's use in courses which also have a laboratory component. These chapters are followed by chapters on illustrative chemical examples to show the reader how to reduce data. The Appendices are necessary and contain useful data on solar irradiance and extended kinetic derivations on chemical systems such as singlet oxygen. The figures and tables throughout the book are pertinent and enhance the discussion in the text.

The author pays careful attention to detail and superbly cross-references material from the various chapters to show the significance and relationship between theory, experiment, and the environment. Although there are some intended redundancies in this method of writing, to which the author admits, this style should permit the book to be an excellent teaching tool as well as an excellent reference source. This book should be of great value to the novice as well as the experienced scientist interested in aquatic photochemistry.

George W. Luther, III, *University of Delaware*

Basic Principles and Techniques of Molecular Quantum Mechanics. By Ralph E. Christoffersen (The Upjohn Company). Springer-Verlag: New York. 1989. ix + 686 pp. $79.00. ISBN 0-387-96759-1.

This text is directed at both graduate and advanced undergraduate courses in molecular quantum mechanics. The scope of material includes a review in classical physics with early experimental material supporting the development of quantum mechanics; an extensive review of linear, matrix, and operator algebra (over 20% of the text); postulates; model

problems; angular momentum; approximation methods; and molecular structure. The final topic represents about half of the text and covers molecular Hamiltonians, Hartree–Fock and SCF methods, and advanced techniques. Some advanced topics throughout the text include relativistic effects, group theory applications, the virial theorems, and a chapter "Beyond Hartree–Fock Theory": various configuration interaction methods and a discussion of many-body perturbation theory (coupled clusters).

The overall level of the material requires a strong physical chemistry background, some comfort with the ideas of classical mechanics, but most importantly a sound mathematics background. Students with just two years of calculus would probably experience difficulties with the material since the author assumes preparedness through advanced calculus. The author clearly chooses to go into greater detail and rigor rather than a superficial exposition. This is especially justified in view of the level of mathematics routinely used in contemporary quantum mechanics, and the mathematics is nicely integrated into the remaining chapters. While the text would be difficult for advanced undergraduates with the traditional training received by chemistry majors, the level is nevertheless quite satisfactory for graduate students in physical chemistry or for those in physical organic chemistry with a significant quantum mechanical component to their research.

In the chapter on model problems, the usual ones are included (square well, ring, harmonic oscillator). However, in the oscillator solution, the coordinate representation using differential equations is abandoned for the creation–annihilation approach. In fact, the author never chooses to solve any problems using series solutions. Particularly interesting is the discussion of the double minimum problem for two square wells.

The chapter on approximation methods is very complete and includes the linear variational method, Rayleigh–Schrödinger Perturbation Theory (both nondegenerate and degenerate), and Brillouin–Wigner Perturbation Theory. Several well chosen applications are included as examples for the variational and RSPT methods.

Unfortunate omissions in the material include unbound states and scattering, time-dependent perturbation theory, and spectroscopy. The author chose to omit these due to space considerations in an already dense, thick volume. This limits the text to courses that emphasize molecular structure.

Again, this text would be excellent for an advanced graduate course and for researchers in structural chemistry. Every chapter has a substantial number of problems for the student to work. In many cases, these problems represent extensions to the material presented in the main text body. The text would also serve as an overall reference in molecular quantum mechanics, especially for its detailed treatment of matrix mechanics. The text contains a large number of references to the original research papers and textbooks (16 pages). A probable competitor would be *Molecular Quantum Mechanics* by P. W. Atkins, but each have a very different topical emphasis. Atkins' text has less formal algebraic treatment than does Christoffersen's and is probably a notch less rigorous. *Basic Principles and Techniques of Molecular Quantum Mechanics* is an excellent addition for any college or university library collection.

David J. Malik, *Indiana University–Purdue University at Indianapolis*

Lipoxins: Biosynthesis, Chemistry, and Biological Activities. Edited by Patrick Y.-K. Wong (New York Medical College) and Charles N. Serhan (Harvard Medical School). Plenum: New York and London. 1988. 163 pp. $49.50. ISBN 0-306-42819-9.

This book is a most appropriate addition, as Volume 229, to the *Advances in Experimental Medicine and Biology* series. Several classes of arachidonic acid metabolites play well-documented, diverse, important physiological roles; the information presented in this volume demonstrates that the lipoxins are yet another family of such metabolites. Some of the chapters are material presented at a 1987 FASEB symposium on lipoxins; some represent invited summaries by additional researchers to supplement the lectures in order to ensure a complete, and current, treatment of this rapidly growing area. In my view, this goal is met admirably, reflecting the editors' success in obtaining contributions from most of those who contributed substantially to the field.

The organization of the book reflects four thrusts of research in the field: identification of five well-characterized lipoxins; lipoxin biosynthesis; laboratory synthesis; and biological effects, which are both different from other arachidonic acid metabolites and different from each other. The first chapter provides a brief overview of these topics, effectively placing the information in the larger context of metabolism of arachidonic acid (and related compounds) and providing a sense of their physiological importance and pharmacological potential.

The next four chapters are descriptions of lipoxin formation by various cells and enzyme preparations, and along the way they present some information about physiological effects, such as the inducement of superoxide anion formation. The chapters are uneven in their presentation of experimental detail, valuable when it is included.

The next two chapters present descriptions of elegant, effective syntheses of lipoxins, successes that are important for placing structure assignments on firm ground. Noteworthy is the use of biosynthetic considerations to guide the choice of synthetic targets; of 128 possible structures, the group was narrowed to eight, leading to the synthesis of the naturally occurring materials without preparing a large number of incorrect compounds. These synthetic capabilities permit preparation of analogues needed for studies designed to uncover the molecular basis for lipoxin activities as well as for discovering ways to exploit this area pharmacologically. Additional synthetic information is included in Chapter 12.

The next chapter presents calculations to uncover the most probable conformations of some lipoxins with and without calcium ion complexation. The results may provide insight into the basis for the differences in the physiological activities of the lipoxins as well as the more general observation that the availability of calcium can play a role in the biosynthesis and the actions of eicosanoids.

Results presented in the last four chapters demonstrate that lipoxins have diverse and important physiological activities. Stereochemistry is important in determining those activities, which include effects that relate to immune response and to microcirculation. Again, some chapters present valuable experimental detail, but in this respect they are uneven.

In general, the chapters are clearly written and well-referenced with high quality, appropriate illustrations. The organization brings these 12 individual contributions into a well-integrated book; its index greatly increases its usefulness. Two chapters provide a glossary of abbreviations; a unified glossary for the entire book would have been a good addition for this volume that deals with such a specialized area, for which abbreviations and terms have been specifically developed.

In summary, this book is a valuable presentation of early work in this expanding field and offers an excellent resource for the many investigators in the field of biomedical research who will find it important to be informed about the biosynthesis, chemistry, and biological activities of the lipoxins.

John P. McCormick, *University of Missouri—Columbia*

Spectroscopic Properties of Inorganic and Organometallic Compounds. Volume 21. Edited by G. Davidson (University of Nottingham) and E. A. V. Ebsworth (University of Edinburgh). The Royal Society of Chemistry: London. 1988. xv + 509 pp. $240.00. ISBN 0-85186-193-8.

This book contains eight chapters comprising a thorough compilation of the spectroscopic information appearing in the literature in 1987 on inorganic and organometallic compounds (with a few references from 1986 not covered in the previous volume). The eight chapters cover the following areas: Chapter 1, Nuclear Magnetic Resonance Spectroscopy by B. E. Mann (University of Scheffield), is by far the largest chapter with 215 pages and 3478 references. Due to the large volume of ^{1}H NMR data available, Mann has chosen to only include ^{1}H NMR spectral data when they make a nonroutine contribution, but complete coverage of relevant papers was attempted where nuclei other than protons were involved. The author has also restricted his coverage of solid-state NMR especially in the case of silicon and phosphorus. Dr. Mann has once again done a remarkable job in covering the vast literature in this area. This chapter has been divided into sections as follows: Stereochemistry, Dynamic Systems (Fluxional Molecules, Equilibria, Ionic Equilibria, Equilibria Among Uncharged Species, Course of Reactions), Paramagnetic Complexes, (transition metals, lanthanides, actinides), Solid-State NMR Spectroscopy, Group IIIB Compounds, Group IVB Elements, Compounds of Group VB Elements, Compounds of Group VIB, Iodine, and Xenon. Mann has also included a very useful appendix cross-referencing the references by nuclei to allow one to quickly find papers pertaining to a given nuclei. Chapter 2, Nuclear Quadrupole Resonance Spectroscopy by K. B. Dillon (University of Durham), 19 pages and 72 references, includes a comprehensive compilation of studies concerning NQR spectra of quadrupolar nuclei ($I > {}^1/_2$) in inorganic and organometallic solids. This chapter is organized by periodic groups for the main group elements and by individual elements for the transition metals and lanthanides. Chapter 3, Rotational Spectroscopy by S. Cradock (University of Edinburgh), 21 pages and 234 references, is divided into five sections: van der Waals and hydrogen-bonded complexes, one each on triatomics, tetraatomics, pentaatomics, and species with six or more atoms. There is one table to summarize data reported on species organized by electron count from 2-electron species to 17-electron species. Chapter 4, Characteristic Vibrations of Compounds of Main-group Elements by G. Davidson (University of Nottingham), 39 pages and 361 references, is organized by periodic groups. Chapter 5, Vibrational Spectra of Transition-element Compounds by G. Davidson (University

of Nottingham), 42 pages and 393 references, is organized by periodic triads of the transition metals. Chapter 6, Vibrational Spectra of Some Co-ordinated Ligands by G. Davidson (University of Nottingham), 54 pages and 495 references, is organized by type of donor ligand. Chapter 7, Mössbauer Spectroscopy by S. J. Clark, J. D. Donaldson, S. M. Grimes (City University, London) and M. J. K. Thomas (University of London), has 87 pages and 461 references. This chapter differs somewhat in organization from the other chapters in this book, including a section reviewing books and review articles on the Mössbauer effect appearing in 1987, and sections on theoretical aspects, instrumentation, and methodology of Mössbauer spectroscopy. This is followed by a review of the Mössbauer active nuclei by element. Chapter 8, Gas-phase Molecular Structures Determined by Electron Diffraction by D. G. Anderson and D. W. H. Rankin (University of Edeinburgh), 22 pages and 48 references is organized by periodic groups for the main group elements and followed by a short section on transition metal complexes.

Eric A. Mintz, *Clark Atlanta University*

Fieser and Fieser's Reagents for Organic Synthesis. Volume 14. By Mary Fieser et al. (Harvard University). John Wiley & Sons: New York and Chichester. 1989. 386 pp. $45.00. ISBN 0-471-50400-9.

This volume sticks to the successful format of its predecessors and lists in alphabetical order an array of reagents that have seen practical use in synthesis. As in the past, preparation of the reagent is described where appropriate, and its use is illustrated by an equation and a few explanatory remarks. Material published in the two and a half years beginning in January 1986 is included, along with the references. The entries vary considerably in length, but there are seldom more than two on a page. Many reagents appear for the first time, but new applications of old reagents (e.g., butyllithium) are also included.

The formulas are well produced and displayed. Since finding a given reagent depends on how the compilers have named it, nomenclature cannot be ignored. The reagent listed as "tributyltinlithium", for example, may not be readily recognized by everyone, and many (most?) chemists would expect to see "tributylstannyllithium". There is a subject index, but it is not the answer to all problems, and alternative names cannot always be found in it. However, one may not feel as strong a need to look up a reagent by name as much as by transformation, such as "reduction", "radical cyclization", etc. Such entries are indeed to be found in the index. One should be on guard, however, for inclusion of them is not comprehensive. For example, there is an index entry for "radical scavengers", but not for "radical trapping", and the information on page 333 on trapping is not referred to under the "scavenger" entry.

With the foregoing caveat, this continues to be a very useful work. Apart from the obvious reference value, it is fruitful to browse in, and a help in keeping abreast of recent developments.

Photochemistry. Volume 20. Edited by D. Bryce-Smith and A. Gilbert (University of Reading). The Royal Society of Chemistry: Cambridge. 1989. xiii + 540 pp. $240.00. ISBN 0-85186-185-7.

Volume 20 begins with an Introduction and Review of the Year by D. Bryce-Smith and A. Gilbert. According to the editors, the coverage in this volume is the same as in Volume 19, except for the unavoidable omission of the section dealing with photochemical aspects of solar energy conversion. They hope to reinstate this topic in the future. Nonetheless, this somewhat shorter volume (540 vs 580 pages in Volume 19) of the Specialist Periodical Report on Photochemistry remains a valuable review of work during the period 1986–1988. From their vantage point as Senior Reporters, Bryce-Smith and Gilbert offer their highlights in photochemistry during the reporting period in this introductory chapter.

Part I, Physical Aspects of Photochemistry by R. B. Cundall, contains one concisely written (less than 40 pages of text), but well referenced (542 references), chapter by this author on Photophysical Processes in Condensed Phases. This review covers subjects such as electron and energy transfer, exciplexes, and singlet and triplet states in condensed media that include liquids, polymers, colloids, and other heterogeneous systems. The smaller and poorer quality type in this chapter, compared with the other sections of this report, are unnecessary distractions to the reader.

Part II, Photochemistry of Inorganic and Organometallic Compounds, contains three chapters by A. Cox: The Photochemistry of Transition-metal Complexes (23 pages, 210 references), The Photochemistry of Transition-metal Organometallic (21 pages, 159 references), and The Photochemistry of Compounds of the Main Group Elements (7.5 pages, 77 references). The overall organization of the material, along with the chapter subsections, makes it relatively easy for readers to locate information of interest to them. Overall, these chapters are very readable with sufficient use of structures to perk the interest of the casual reader.

Part III, Organic Aspects of Photochemistry, contains three chapters by W. M. Horspool [Chapter 1, Photolysis of Carbonyl Compounds (18 pages, 55 references); Chapter 2, Enone Cycloadditions and Rearrangements (63 pages, 145 references); Chapter 3, Photochemistry of Alkenes, Alkynes and related Compounds (33 pages, 86 references)] along with contributions by A. C. Weedon [Chapter 4, Photochemistry of Aromatic Compounds (52 pages, 185 references)] and A. Cox [Chapter 5, Photo-reduction and -oxidation (12 pages, 125 references)], and two chapters by S. T. Reid [Chapter 6, Photoreactions of Compounds containing Heteroatoms other than Oxygen (40 pages, 208 references); Chapter 7, Photoelimination (33 pages, 214 references)]. These seven chapters provide an excellent review of organic photochemistry in a highly useful format. The many structural formulas help direct the reader to topics of interest.

Part V contains a single chapter by N. S. Allen (33 pages, 521 references). The material in this chapter is organized by process (photopolymerization, photo-cross-linking, photografting, optical and luminescence properties, photodegradation, and photooxidation) and type (polyolefins, polyvinyl halides, polystyrenes, etc) and ends with sections on photostabilization and dyes and pigments. This chapter is remarkably coherent despite the high level and diversity of research activity in this area. This chapter should be a handy reference guide for polymer photochemists.

In summary, *Photochemistry, Volume 20*, is a highly useful compendium of recent work in the above areas of coverage.

Lawrence A. Singer, *University of Southern California*

The Chemistry of Enones. Parts 1 and 2. Edited by Saul Patai and Zvi Rappoport (Hebrew University). John Wiley & Sons: New York and Chichester. 1989. Part 1: xvi + 597 pp. $315.00. ISBN 0-471-91563-7. Part 2: xvi + 688 pp. $327.00. ISBN 0-471-92289-7.

The latest pair of volumes in the ever-expanding and ever-valuable series *The Chemistry of Functional Groups* treats unsaturated aldehydes in ketones comprehensively, with understandably great emphasis on conjugated examples. Coverage of the literature is stated to be "up to late 1987 or early 1988". The first few chapters are devoted to theoretical, structural, spectroscopic, and thermochemical aspects. Synthesis of enones fills one chapter, and synthetic uses of enones fills another. Reactions of enones are so many and varied that many chapters are required to cover them, with individual subjects such as acid–base behavior, nucleophilic and electrophilic attack, electrochemistry, photochemistry, oxidation and reduction, and enzymatic conversions each being given a chapter. There are also chapters on organometallic derivatives, enolization, synthesis with chiral enones, and polymerization. Cycloadditions will be treated in a forthcoming volume.

Although the two parts of this twin-volume work are priced separately, the subject and author indexes are only in Part 1. They are quite substantial, as befits the reference value of this work.

Control of Liquid–Liquid Extraction Columns: Topics in Chemical Engineering 5. By K. Najim (Institut National Polytechnique de Toulouse, France). Gordon and Breach: New York. 1988. xii + 259 pp. $60.00. ISBN 2-88124-7032.

The subject of this book is adaptive control theory with liquid–liquid extraction columns used as application examples. Adaptive control is relatively new; unfortunately, few chemists and chemical engineers have sufficient training in advanced control theory shorthand to benefit from this book.

Adaptive control requires a model of the dynamic process with all its associated parameters. Since these parameters can change with time as the process runs, the first chapter presents a variety of methods to identify and update these parameters from process data. These methods include a variety of simple and recursive least-squares methods as well as a least-squares method using forgetting functions, tending to give more emphasis to the most recent process information. Methods to deal with parameter estimate drift and deadtime estimation are also discussed. Fortran subroutines are presented for several of the identification methods.

Adaptive control techniques to continuously update the system model and control action are presented in the second chapter. Pole placement adaptive control algorithms, a linear quadratic Gaussian controller, and generalized predictive control are presented to provide self-tuning control action in a dual loop manner. One loop controls the process while the other keeps the predictive model of the process dynamics updated as the process inputs change with time. An interesting second approach to adaptive process control is a learning system which works in a random environment to improve its control behavior based on the responses of the system. This learning system has a performance evaluation unit and a stochastic automaton with variable hierarchical structure, the probability distribution of which it adjusts to minimize some criteria. Fortran subroutines are presented to aid the reader in implementing both these approaches.

A pulsed perforated-plate liquid–liquid extraction column was used to demonstrate a self-tuning linear quadratic Gaussian controller to control the continuous-phase composition by manipulating the pulse frequency. The time behavior of the model parameters and the input and output variables is shown graphically under adaptive control. The control is quite good. The behavior of several learning automaton control systems is also demonstrated by using the pulsed column with excellent results. Adaptive control of a Kuhni rotary mixed column is also demonstrated by using the mixer rotation speed as the manipulated variable.

This book is a good collection of current adaptive control methods with a large modern list of references. For those well versed in the modern control mathematics it provides much information that is unlikely to be found in book form elsewhere. It is clearly not an introductory text that can be easily utilized by those without a very strong control background.

Vernon C. Smith, *Hercules Research Center*

Analysis of Sterols and other Biologically Significant Steroids. Edited by W. D. Nes (United States Department of Agriculture) and E. J. Parish (Auburn University). Academic: San Diego and New York. 1989. xv + 341 pp. $69.00. ISBN 0-12-515445-3.

This book chronicles the analytical development of physiologically active steroids found in plant and mammalian sources. The first half of the text deals with source *applications* to various steroids, and the second half deals with a battery of analytical *techniques* to identify these steroids.

Substantial attention is given to detail the necessary initial extraction, isolation, and purification steps. Clear schemes for these steps are shown. Chromatographic separations were heavily relied upon for *class separation* following sample preparation. Normal, reversed, and other bonded phases are discussed at some length, and some experimental procedures are also included. These detailed treatment steps and separations provide a *consistent content format* in almost every chapter.

The *analytical detection* of steroid analysis in the first half is not as equally treated and this is probably because of the particular steroid application. The *reference citation* appears comprehensive and recent; the *reference system* used, however, is not consistent.

The coverage of specific steroid analytical techniques (e.g., X-ray crystallography, mass spectrometry, NMR, IR, Raman, and fluorescence) is excellent, and it provides the determinative underpinnings for the earlier separation techniques (e.g., sample preparation and chromatography).

The practicality and thoroughness of this book is undeniable. I would recommend this text strongly to chemists, biochemists, and related health scientists working in the steroid and lipid fields.

Barrie Tan, *University of Massachusetts*

Introduction to Thermal Analysis: Techniques and Applications. By Michael E. Brown (Rhodes University). Chapman and Hall: New York and London. 1988. viii + 211 pp. $39.95. ISBN 0-4102-30230-6.

While it is acknowledged as an established grouping of techniques for analytical chemical characterization, thermal analysis does not usually figure prominently in academic courses, often being relegated to the "miscellaneous techniques" category reviewed after the "major" areas have been covered. Also, thermal methods and their necessary instrumentation do not find wide use in many general analytical laboratories. They may not be considered particularly glamorous or may be consigned to a supporting role of sample characterization; thus, relatively few practicing analytical chemists or students are sufficiently aware of their power and versatility. The author has made a major contribution to remedy this situation with a readable basic textbook covering material rarely seen in general analytical texts, at a level where the reader may gain an adequate overview of the information to be obtained from the various methods. The intended audience is that with little knowledge of the subject, and the author has defined a good balance between theory and practice, referring readers to more advanced specialized texts. For an introductory book, the references are substantive and well chosen. This is a book which will provide a ready resource for both student and the laboratory bookshelf. The writing style is concise with good use made of instrumentation description and graphical treatments of data to exemplify thermal methods.

Introductory chapters on definitions, history, and thermal events are very brief and perhaps this is the one area which could benefit from expansion. Such is the diversified nature of thermal analysis that the necessary chapter structure covers single technique areas in sequence, commencing with the most widely used methods of thermogravimetry (TG), and differential thermal analysis (DTA) and scanning calorimetry (DSC). A later chapter on purity determination by DSC might have been usefully included at this stage. There follow chapters on better known techniques such as thermomechanical analysis (TMA) and evolved gas analysis (EGA), together with numerous less frequently encountered methods based on optical, electrical, magnetic, sonic, and other effects. These sections should alert the reader to the wide scope of thermal analysis in problem solving and sample characterization. The topics of reaction kinetics, data handling, and interpretation through computers are considered, with programs listed; the literature and nomenclature of the field are also covered.

This book is a valuable starting point for those wishing to explore the field and could serve as a text for an introductory course, whence it was actually derived. It could serve as a model for coverage of other basic areas of analytical chemistry in an accessible fashion.

Peter C. Uden, *University of Massachusetts*

Techniques of Chemistry. Volume XX. Techniques for the Study of Ion–Molecule Reactions. Edited by James M. Farrar and William H. Saunders (University of Rochester). John Wiley & Sons: New York. 1988. xii + 652 pp. $99.50. ISBN 0471-84812-3.

The stated purpose of this book is to provide descriptions of the various techniques presently available or under development for the study of ion–molecule reactions in the gas phase. The descriptions contain a great deal of information on the construction and operation of apparatus that could be applied to a wide range of gas-phase ion–molecule problems by new research students and by practitioners in search of details of an unfamiliar technique. The book contains 11 chapters, each written by well-qualified authors who place heavy emphasis on 11 different techniques. Although not intended to be encyclopedic, the coverage of techniques is very good.

The first six chapters describe methods used primarily to probe "bulk" properties such as thermodynamic quantities and rate constants. The techniques treated here are ion cyclotron resonance spectrometry, Fourier transform mass spectrometry, electron bombardment flow, flowing afterglow and SIFT, high-pressure mass spectrometry, and nuclear-decay techniques. The final five chapters deal with "microscopic" techniques and include ion–beam methods, photoionization, spectroscopic probes, infrared laser photolysis, and pulsed methods for cluster ion spectroscopy. Each technique is introduced with the basic theory and is followed by a more detailed discussion of apparatus and experimental considerations, including selected illustrations of application. An emphasis on technique and not results is maintained throughout the volume. An extensive bibliography is included for each method with references as recent as 1988. With few exceptions the style is clear and readable. The book contains enough information so it can be read by graduate students with limited background in the field. The descriptions will be helpful in understanding the range of problems to which each method is suited.

The book is up-to-date in its coverage of the techniques of ion–molecule reactions, and it concludes with a very good index. Students and researchers new to any of the techniques presented will find it to be useful, reasonably comprehensive, and authoritative. As such, it will be a welcome and well-used volume. It deserives to be in the library of experimentalists in the field of gas-phase ion–molecule reactions.

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