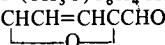
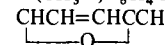


Table I. Aldol Condensations of 2 with Aldehydes

entry	aldehyde	product (3) <sup>a</sup>	yield, % <sup>b</sup>
a	C <sub>6</sub> H <sub>5</sub> CHO	C <sub>6</sub> H <sub>5</sub> CH(OH)CH <sub>2</sub> COC <sub>6</sub> H <sub>5</sub>	85, 84, <sup>c</sup> 78 <sup>d</sup>
b	<i>o</i> -(CH <sub>3</sub> O)C <sub>6</sub> H <sub>4</sub> CHO	<i>o</i> -(CH <sub>3</sub> O)C <sub>6</sub> H <sub>4</sub> CH(OH)CH <sub>2</sub> COC <sub>6</sub> H <sub>5</sub>	85
c	CHCH=CHCCHO 	CHCH=CHCCH(OH)CH <sub>2</sub> COC <sub>6</sub> H <sub>5</sub> 	90 <sup>e</sup>
d	(CH <sub>3</sub> ) <sub>2</sub> CHCHO	(CH <sub>3</sub> ) <sub>2</sub> CH(OH)CH <sub>2</sub> COC <sub>6</sub> H <sub>5</sub>	66
e	(CH <sub>3</sub> ) <sub>3</sub> CCHO	(CH <sub>3</sub> ) <sub>3</sub> CCH(OH)CH <sub>2</sub> COC <sub>6</sub> H <sub>5</sub>	47
f	<i>trans</i> -C <sub>6</sub> H <sub>5</sub> CH=CHCHO	<i>trans</i> -C <sub>6</sub> H <sub>5</sub> CH=CHCH(OH)CH <sub>2</sub> COC <sub>6</sub> H <sub>5</sub>	67
g	<i>o</i> -(HO)C <sub>6</sub> H <sub>4</sub> CHO	<i>o</i> -(HO)C <sub>6</sub> H <sub>4</sub> CH(OH)CH <sub>2</sub> COC <sub>6</sub> H <sub>5</sub>	37 <sup>f</sup>

<sup>a</sup> Satisfactory spectral data were obtained for all new compounds. <sup>b</sup> Yields are of isolated materials homogenous by TLC. <sup>c</sup> With SnCl<sub>4</sub> in CH<sub>2</sub>Cl<sub>2</sub> at -40 °C. <sup>d</sup> With BF<sub>3</sub>O(C<sub>2</sub>H<sub>5</sub>)<sub>2</sub> in CH<sub>2</sub>Cl<sub>2</sub> at -40 °C. <sup>e</sup> Yield estimated by <sup>1</sup>H NMR spectroscopy. <sup>f</sup> Yield not optimized.

To our knowledge, NAD(P)<sup>+</sup>/NAD(P)H cofactors have not (yet) been implicated in carbon-carbon bond forming counterparts of the reactions described here although the chemical validity of such processes is now firmly established. We note that enols of,

for example, pyruvate, lactal, dihydroxyacetone, etc. add to NAD<sup>+</sup> and inhibit the redox process.<sup>10</sup>

**Acknowledgment.** The Dutch National Science Foundation (Z.W.O./S.O.N.) has provided a fellowship for S.H.M.

(9) See: (a) Mukaiyama, T.; Narasaka, K.; Bunno, K. *Chem. Lett.* **1973**, 1011. (b) Murata, S.; Suzuki, M.; Noyori, R. *J. Am. Chem. Soc.* **1980**, *102*, 3248. (c) McNamara, J. M.; Kishi, Y. *J. Am. Chem. Soc.* **1982**, *104*, 7371.

(10) For example: Florin, M.; Stotz, H. E., Eds. *Compr. Biochem.* **1966**, 1-198.

## Additions and Corrections

**Selectivities of  $\pi$ - and  $\sigma$ -Succinimidyl Radicals in Substitution and Addition Reactions. Appendix: Response to Walling, El-Taliawi, and Zhao [J. Am. Chem. Soc. **1983**, *105*, 5125].** P. S. SKELL,\* R. L. TLUMAK, and S. SESHADRI

Page 5126, Table I: Column 6 [BrCHCl<sub>2</sub>], M should read BrCHCl<sub>2</sub>, mmol; column 7 [BPI], M should read BPI, mmol.

Page 5128, Table VIII: Row seven should read isobutane, *tert*-butyl + SH, 5.1, 0.18; row eight should read 1-bromobutane, 1-bromo-2-butyl + SH, 0.68, nothing.

Page 5129, Table IX: Column 4, row 8-640 should read 750; column 5, row 8-25000 should read 1.5 × 10<sup>5</sup>.

## Book Reviews\*

**Basic Analytical Chemistry.** By L. Pataki and E. Zapp (Eötvös Loránd University, Budapest). Pergamon Press Ltd., Oxford. 1980. xiii + 463 pp. \$55.00.

The authors of this text have endeavored to condense the features of analytical chemistry, both qualitative and quantitative analysis and classical and instrumental methods, into a single volume. They have done so in part to emphasize the unity of analytical chemistry, beginning with solution equilibria and proceeding to the group reactions used in systems of qualitative analysis. A survey of the principles of quantitative analysis and analytical instrumentation is then presented, followed by a chapter on analysis of organic compounds. The authors have made some compromises in order to reduce the amount of material to a single volume, and they have chosen to give a brief survey of many methods rather than to discuss methods and their theories to any great depth.

In spite of the title of this book, it is not really designed around the requirements of an introductory course in quantitative analysis. For example, there is no discussion on the principles and use of weights and measures. Typical laboratory manipulations and suggested experiments are not included, and the concepts of primary standards and their use in reagent preparation should be included in an introductory text. In addition, some sample problems or exercises at the ends of the chapters might help clarify concepts in solution equilibrium. The Pataki-Zapp text could probably be used for introductory quantitative analysis if supplemented by a good laboratory manual and some additional explanation by the instructor. For a course on chemical instrumentation, this text is perhaps not quite detailed enough, although most instrumental methods are mentioned. The chapters on qualitative analysis and analysis

of organic compounds are quite good. Perhaps this text might best be utilized in an undergraduate advanced analytical chemistry course including both the chemistry and instrumentation of analytical chemistry.

Duane P. Matthees, *South Dakota State University*

**Chemical Publications: Their Nature and Use. Fifth Edition.** By M. G. Mellon (Purdue University). McGraw-Hill Book Company, New York. 1982. xii + 419 pp. \$24.95.

The appearance of the 5th edition of Mellon's "Chemical Publications" is a welcome event. For decades, earlier versions of this work complemented other guides to the chemical literature, including such classics as the books by Soule; Crane, Patterson, and Marr; Bottle; and Burman. In recent years, however, the 4th edition had been eclipsed by more current works on the subject, including a revision of the book by Bottle and new titles by Woodburn, Antony, Maizell, and Skolnik. Useful in their own right, none of these works precisely filled the gap left by 17 years without a new edition of Mellon, although Skolnik's more expensive "The Literature Matrix of Chemistry" (Wiley, 1982) came close. The 5th edition of "Chemical Publications" once again provides American chemists with a well-written, up-to-date guide to the burgeoning professional literature, one that simultaneously offers depth and breadth of coverage.

The book is divided into two parts. Part I (Publications: Kinds and Nature) begins with a brief description of the origin and development of the chemical literature. The next 11 chapters divide chemical publications into primary, secondary, and tertiary sources. Within these categories, Mellon discusses periodicals, technical reports (mainly government documents), patents, dissertations, trade publications, indexing and abstracting journals, reviews, bibliographies, tabular compilations, dic-

\*Unsigned book reviews are by the Book Review Editor.

tionaries, encyclopedias, formularies, treatises, monographs, textbooks, nonprint media, guides, and directories. Part II (Publications: Storage and Use) describes libraries, manual searching of printed sources, and computer searching of data bases. The book concludes with a set of library problems and a list of references on technical writing.

Although the titles and organization of chapters are similar to those found in previous editions, the book has been extensively rewritten. In every chapter, obsolete references have been deleted and new ones added, even in the bibliography on technical writing, which Mellon suggests he has simply reprinted. The book is nearly 100 pages longer than the 4th edition, owing in large part to the inclusion of an excellent chapter (the longest in the book) on computer searching contributed by Edward P. Bartkus and David F. Krentz, both from the Information Systems Department at Du Pont. Some subheadings in the 4th edition, notably the material on *Chemical Abstracts*, have been expanded to full chapters. Within chapters, many new subheadings have been added, reflecting recent developments in the chemical literature. Preprints, microform editions, copyrights, and dual publication are some of the new subheadings in the chapter on periodicals, for example. A nifty table of alchemical symbols has been included. To make room for this wealth of new material, a few items have been removed or abbreviated. The library problems, for example, have been severely curtailed.

Throughout the book, Mellon mingles detailed commentary on individual sources and subjects with extensive lists of pertinent references. His discussions of *Chemical Abstracts*, patents, Beilstein, and Gmelin are particularly thorough, being among the best essays on the topics anywhere. Unlike Skolnik, Mellon also offers liberal advice about how to use the sources he describes and, a more formidable task, how to manage the literature as a whole.

The book has few deficiencies, the most serious being a failure to give proper attention to the vast literature on safety and toxicology. The few references cited on these topics are widely scattered and poorly indexed.

Except for the contributed chapter on computer searching, the book contains remarkably few errors. Even in this chapter most of the errors are minor, but misalignment of entries in one table (page 313) and misspellings in the following one (page 314) make nonsense of an otherwise excellent discussion of the use and advantages of truncation in the preparation of lists of keywords for computer searching.

The potential audience for the book extends far beyond the boundaries of such obvious groups as chemists and librarians. For example, the list of references on early chemistry is sufficiently extensive to be useful to historians of science. The book is a valuable searching tool for both students and experienced scientists in all branches of chemistry and in many related fields, including medicine, engineering, physics, and agriculture, regardless of whether they work in academics, industry, or government. In short, "Chemical Publications" is an indispensable addition to any chemistry library, personal or institutional, and it would be a useful acquisition for many others.

L. Lee Melhado, *University of Illinois at Urbana-Champaign*

**Wilson and Wilson's Comprehensive Analytical Chemistry. Volume XV. Methods of Organic Analysis.** By L. Mázor (Technical University of Budapest). Series editor G. Svehla. Elsevier Scientific Publishing Co., New York and Amsterdam. 1983. xxii + 529 pp. \$138.25.

This volume covers both qualitative and quantitative analysis of organic compounds, and includes methods for detecting and determining the elements in them as well as methods for functional groups and for a selection of some important specific compounds, such as ethanol. Even methods for determining physical constants are included, and macro, semimicro, and micro techniques are discussed. It is very useful to have all aspects brought together, and the large number of references to original publications makes this both a source of immediately useful information and an entry to the literature.

The strength of this book lies in the quantitative section, which fills about half the volume. It is full of practical detail. The weakness, and it is a big one, is in instrumental methods. Only 7 pages are devoted to all forms of spectroscopy combined, and the only value in this section is for very general orientation. Even the references are extremely scanty; they consist of nine books, most of which were published in the 1960s, and nothing more. Chromatographic methods are treated little better; the subject is allotted only 13 pages.

This book has extraordinary shortcomings, especially in the qualitative part, and one is embarrassed for the author for the amount of gratuitous misinformation and hopeless anachronisms. Books such as this make one realize that a writer should resist attempting to explain to others a subject that he does not fully understand himself, no matter how great an expert he may be in his own specialty. An example in the present case is the explanation offered for the catalytic effect of pyridine in the reaction of acid chlorides with alcohols: "—pyridine forms a complex with the chlorine atom of the acid chloride:  $\text{Cl}-\text{NC}_5\text{H}_5$ ". Pentavalent nitro-

gens abound; in one place, several bisulfate salts are written as though they were hydroxylamine-*O*-sulfonic acids, with an O-N bond. The mechanism shown for the Fujiwara reaction (pyridine with chloroform and NaOH) is straight out of the 19th century.

There is an index, but it is inadequately short. For example, there is only one page number given for "Nessler's reaction", whereas it is mentioned in several different places in the book. (Curiously, this reaction, and the reagent  $\text{K}_2\text{HgI}_4/\text{KOH}$ , is never specifically identified in the text.) Some significant reactions are not mentioned, such as the isocyanide test for primary amines ("carbonylamine reaction") and the use of phthalic anhydride for distinguishing primary, secondary, and tertiary amines.

There are other shortcomings that must be laid at the door of the editor and/or publisher. There are no running headings at the tops of the pages, a lack that is especially felt in a work of this sort. Equations are set inconsistently and confusingly, sometimes with an arrow, sometimes with an equal sign. The problem is compounded by the fact that many equations are set with no spaces at all between the equal sign and the formulas, or even between the formulas and the plus signs, and the equal sign is easily mistaken for a double bond and the short arrows for semipolar double bonds. As an example, one finds on p 154 this equation " $=\text{C}=\text{O}+\text{NH}_2\text{NH}\cdot\text{C}_6\text{H}_5=\text{C}=\text{NH}\cdot\text{C}_6\text{H}_5+\text{H}_2\text{O}$ ". Dots (usually single, sometimes double) are erratically used in place of lines for single bonds, sometimes mixed in the same structure. Nomenclature is sometimes strange, such as in the use of "dithionyl" where "bithienyl" is required and "picryldiphenylhydrazide" for "picryldiphenylhydrazyl". Some tests and procedures are inadequately described; for example, the ninhydrin test for amino acids is presented on p 181 without stating what color is produced.

This volume is a useful catalog of empirical analytical methods, but one has a right to expect better quality, especially in a book of high price.

**Advances in Heterocyclic Chemistry. Volume 33.** Edited by A. R. Katritzky. Academic Press, New York. 1983. ix + 336 pp. \$65.00.

The progress and proliferation of heterocyclic chemistry continues unabated, and reviewers must work hard to keep up with the output of primary research. This means supplementary reviews become necessary at frequent intervals. This volume contains three of them. One is actually a complement to a fairly recent review, and is about the photochemistry of heterocycles that contain oxygen or sulfur; the same author, S. T. Reid, reviewed nitrogen heterocycles before. Naphthyridines are reviewed again by Paudler and Sheets, after a gap of 22 volumes! Their chapter is complemented by a companion review on the reactions of naphthyridines with nitrogen nucleophiles, by van der Plas, Wözinak, and van der Haak. This chapter is much concerned with nuclear amination by metal amides, an extension of the Chichibabin reaction.

The two new subjects in this volume are pyrido[1,2-*a*]pyrimidines, about which Hermecz and Mészáros have assembled a formidable bibliography of 469 references, and pseudoazulenes, by which term are denoted heterocyclic ring systems in which one of the electron pairs contributing to the  $10\pi$  aromatic system of azulene is contributed by the formal lone pair on a hetero atom. This subject is given a broad review by Timpe and El'tsov. This volume concludes with the usual cumulative index of titles of chapters in the series, but lacks a subject index.

**The Flavonoids: Advances in Research.** Edited by J. B. Harborne (University of Reading, UK) and T. J. Mabry (University of Texas at Austin). Chapman and Hall, London. 1982. xii + 744 pp. \$114.00.

Flavonoids are a highly oxygenated, widely distributed class of natural products, which, to organic chemists, are synonymous with the colors of vascular plants. (Canadian chemists especially appreciate the significance of anthocyanins as phytoalexins (stress markers) during the multicolorful Indian summers.) These compounds are valuable taxonomic markers, have some dietary and medicinal significance, are used as safe food additives, and yet, at times, represent mutagenic substances.

This volume is a supplement to "The Flavonoids" (published in 1975, same editorship) covering progress in the field during the period 1975-1980. Although it updates the previous work, the present volume is self-contained and, where appropriate, includes data from "The Flavonoids" as part of tubular compilations. Some topics of the earlier work are not covered; this is a reflection of current research emphasis. It is a comprehensive work by 20 contributors covering a spectrum of topics and an important addition to the flavonoid literature which will be indispensable to the specialist. For the uninitiated, it is a starting point for detailed study; however, it will not provide a quick overview of the various aspects of flavonoid research.

The initial two chapters deal with flavonoid isolation methods and  $^{13}\text{C}$  NMR spectroscopic identification. The first shows how HPLC has become a dominant technique for separation of complex mixtures; the second displays 125  $^{13}\text{C}$  NMR spectra of flavonoids identifying each by a clear structure and the name of the investigator who obtained the

spectrum. The last two chapters of the book summarize advances in biosynthesis and mammalian metabolism of flavonoids: the former gives an appreciation of the current detailed knowledge of the enzyme systems involved; the latter, the first comprehensive coverage of the topic, has significance because of the mutagenic and carcinogenic nature of some flavonoids. Sandwiched in between are 18 chapters on the various classes of flavonoids with the longest devoted to the Minor Flavonoids and Isoflavonoids (100 pages each). Every chapter ends with a check list of all known compounds of a particular flavonoid class discovered in the 1975-1980 period.

The major part of the volume consists of tables of flavonoid distribution and figures of spectra. Structural formulae are liberally used in most chapters. Synthesis is the only aspect of flavonoid research which is not adequately stressed and evaluated. The synthetic chemist searching for new targets to conquer cannot visually retrieve information in the accustomed manner today and will need to read more thoroughly.

This is a well-organized and highly commendable work which shows that flavonoid research is alive and well in the 1980's.

V. Snieckus, *University of Waterloo, Canada*

**Nonlinear Laser Chemistry.** By V. S. Letokhov (USSR Academy of Sciences). Springer-Verlag, Berlin and New York. 1983. viii + 417 pp. \$39.50.

Among the most notable consequences of the "laser revolution" is the explosive growth of interest in multiple-photon spectroscopy and photochemistry. This book, by a pioneer in the field, discusses in depth many of the major issues, including multiple-photon atomic and molecular ionization phenomena, the search for mode-selective or molecular site-selective photochemical reactions, isotope separation, photoionization mass spectrometry, and "single atom" and "single molecule" detection. Aficionados of laser spectroscopy will find the book essential reading, but there also is much to attract and interest a broader audience. A careful treatment of the conditions which must be satisfied to achieve inter- or intramolecularly selective photochemical reactions is of broad interest. Especially intriguing are treatments of such new, and potentially major, techniques as laser ionization ("two-dimensional") mass spectrometry and photoelectron or photoion microscopy (for which the theoretical limits of spatial, temporal, and spectral resolution are stunning). While the author is a strong enthusiast for these techniques, a significant effort is made to acknowledge practical obstacles to their implementation which have not yet been surmounted.

The book is densely, but clearly, written. Literature citations (emphasizing Soviet contributions but generally reasonably comprehensive) through early 1980 are cited in the text, and an addendum compiles additional references through mid-1982. The index is adequate.

Overall, I found this to be an extremely stimulating monograph. Despite the rapid pace of publication in the field, the book deals in a sufficiently authoritative way with fundamental issues that it should retain its value for a considerable time to come.

E. L. Wehry, *University of Tennessee (Knoxville)*

**Electron Spin Resonance. A Comprehensive Treatise on Experimental Techniques.** By Charles P. Poole, Jr. (University of South Carolina). John Wiley and Sons, Inc., New York, NY. 1983. xxvii + 780 pp. \$69.00.

The first edition of this book placed in one volume, for the use of those interested in electron spin resonance (ESR), the salient background contained in the classic MIT Radiation Laboratory Series on microwave engineering. It was enthusiastically received as a comprehensive and needed reference, principally for experimental techniques in the field.

In this second edition I think the author has appropriately deleted "theory" in preference for "experiment" in order to be able to expand and update its contents to cover progress made during the last 15 years. The number of chapters has dropped from 21 to 14 and the number of pages from 922 to 780, but this is largely due to a more compact printing format. An attractive feature of the reprinting is the section headings at the top of every other page, not just chapter headings. It is clear that the book has been thoroughly revised, improved, and updated with recent work and references.

The initial chapters give a very brief introduction to ESR and then deal with the components and functions of the spectrometer. The chapter headings are Guided Electromagnetic Waves, Microwave Generators, Waveguide Components, Resonant Cavities, Magnetic Field, Scanning and Modulation, and Detection. These are followed by three chapters concerned largely with samples, their preparation, and the variation of temperature, pressure, and radiation. They are entitled Vacuum Systems, Variable Temperatures and Pressures, and Irradiation. Chapter 11, Sensitivity, includes a section on computer data processing and spectrometer systems. Line shapes are discussed in great detail in Chapter 12 (considerably expanded from the first edition) including those in

random, semirandom, and motional systems. Computer applications, covering a wide range of programs, are given in a very abbreviated form. Chapters 13 and 14 are on Relaxation Times and Double Resonance; they have been updated extensively with consideration of such topics as saturation transfer, muon spin rotation, and optical double magnetic resonance.

This is a welcome revision and a useful book to present and future ESR spectroscopists.

William Weltner, Jr., *University of Florida*

**Chromatographic Science Series. Volume 22. Analytical Pyrolysis: A Comprehensive Guide.** By William J. Irwin (University of Aston in Birmingham). Marcel Dekker, New York. 1982. xii + 578 pp. \$69.50.

This book is a rather detailed survey of analytical pyrolysis (in contrast to applied pyrolysis), describing its qualitative, quantitative, mechanistic, and kinetics uses. The first of two major sections, techniques, deals with development and methodology. It includes an interesting historical perspective as well as chapters on pyrolysis methods, pyrolysis gas chromatography, pyrolysis mass spectrometry, and data handling. The latter is accompanied by three computer programs for use in making fingerprint comparisons and one for the quantitative evaluation of pyrograms. The second major section, applications, includes chapters on synthetic polymers, biological molecules, taxonomy, drugs and forensic science, and organic geopolymers. Every chapter is followed by an extensive list of references; reference is made to 963 individual articles and book sections, the most recent appearing in 1980.

This very well written book includes a large number of fine illustrations and is replete with current applications of and potential uses for analytical pyrolysis. It will be particularly helpful to scientists dealing with large, nonvolatile molecules who are not in the vanguard of the field, although not as attractive to those who are. Its clarity is such that it would be an appropriate textbook for an upper level or graduate pyrolysis course.

Alfred M. Wynne, *Chemistry Department, GRC Towers*

**Specialist Periodical Reports. Volume 13. Photochemistry.** Edited by D. Bryce-Smith (University of Reading). The Royal Society of Chemistry, London. 1983. xxvi + 637 pp. \$82.00.

The latest volume of the Specialist Periodical Reports on Photochemistry maintains the high standards of the preceding volumes. This volume covers a review of the literature on photochemistry published between July 1980 and June 1981. Essentially the same organization of previous volumes in the series is kept except that in this as well as subsequent volumes the separate treatment of theoretic and spectroscopic aspects is discontinued; these are incorporated within Part I, Physical Aspects of Photochemistry, of this volume. The other parts include the following: (II) Photochemistry of Inorganic and Organometallic Chemistry, (III) Organic Aspects of Photochemistry, (IV) Polymer Photochemistry, (V) Photochemical Aspects of Solar Energy Conversion. Each part contains several well-written chapters by experts in those fields. These chapters are devoted to a complete overview of the literature period covered in each area rather than to a critical review of the most significant papers appearing. Some papers are briefly discussed while the majority are just mentioned. Diagrams, equations, and structural formulas are well used throughout the volume.

In summary, this volume and the series should be of continuous general interest to researchers in the field of photochemistry and is recommended as a useful overview of and guided access of the primary literature in photochemistry rather than as a replacement for it. This volume contains a few typographical errors and the price is almost half of the previous volume, making it more attractive.

Rafael Arce, *University of Puerto Rico*

**Excited States. Volume 4.** Edited by Edward C. Lim (Wayne State University). Academic Press, New York. 1979. x + 400 pp. \$42.50.

This volume presents four reviews: Resonance Raman Spectroscopy—A Key to Vibronic Coupling, by William Siebrand and Marek Z. Zgierski; Magnetic Properties of Triplet States, by David W. Pratt; Effect of Magnetic Field on Molecular Luminescence, by S. H. Lin and Y. Fujimara; and Time-Resolved Studies of Excited Molecules, by André Tramer and René Voltz. Each article has a very extensive bibliography, and the volume concludes with a detailed subject index.

The article by Siebrand and Zgierski is mainly theoretical, presenting an introduction to the principles of resonant Raman spectroscopy rather than describing experimental procedures or reviewing existing research results. The authors' aim is to describe the potential of this approach to the solution of vibronic coupling problems.

Pratt describes the variety of zero-field, high-field, and coherence experiments that have been applied to study the magnetic and optical properties of molecular triplet states in the gas phase. It is useful as a

wide-ranging survey of the methodologies.

In the shortest of the four articles, Lin and Fujimara outline the theory and describe the limited available experimental results on quenching of molecular luminescence by an applied magnetic field. The theory presented would be useful to anyone contemplating a study of the dynamical properties of excited electronic states.

The Tramer and Voltz article presents a uniform description of the decay of initially excited states ranging from the small-molecule limit to the statistical limit, but with major interest in the more complex intermediate range.

The reviews are consistent in approach and are written at a level accessible to beginning graduate students having a basic knowledge of the quantum mechanical description of molecular spectroscopy. The major factor opposing the purchase of this book now is the 5 years that have elapsed since it was written. The fields described have progressed very rapidly during that interval.

James E. Boggs, *The University of Texas at Austin*

**Excited States. Volume 5.** Edited by Edward C. Lim (Wayne State University). Academic Press, New York. 1982. x + 204 pp. \$49.50.

The latest volume in this series contains three articles: *Ab Initio Calculations of Excited-State Potential Surfaces of Polyatomic Molecules*, by Ernest R. Davidson and Larry E. McMurchie; *The Vibronic Spectroscopy of Benzene: Old Problems and New Techniques*, by Lawrence D. Ziegler and Bruce S. Hudson; and *QSM Theory: A Time-Dependent Quantum Statistical Mechanical Theory for Molecular Relaxation Processes*, by W. A. Wassam, Jr. There are extensive bibliographies and the volume has a subject index.

The survey of theoretical potential surfaces by Davidson and McMurchie is much shorter (39 pages) than most in this series. After a very brief qualitative description of available techniques for treating electron correlation, the article is devoted to a summary of the current state of knowledge for specific small polyatomic molecules.

Ziegler and Hudson analyze the very wide literature on vibrations of the excited electronic states of benzene. The coverage is thorough and balanced. Both this article and the previous one are more descriptive and less mathematical than are most previous reviews in this series.

The final article, by Wassam, presents "a unification of quantum statistical mechanical theory, the phenomenological theory of irreversible thermodynamics, and kinetics". While ample reference is made to background information, the article is essentially a new contribution rather than a survey or review. This paper will surely appeal to a different audience than will the first two.

This volume belongs in major libraries and the separate articles will be of interest to workers in the fields covered.

James E. Boggs, *The University of Texas at Austin*

**Magnetic Resonance in Biology. Volume 2.** Edited by Jack S. Cohen (National Institutes of Health). Wiley-Interscience, New York. 1983. xii + 308 pp. \$69.95.

This is the second volume in the series dealing with "Magnetic Resonance (NMR & ESR) in Biology". This volume is composed of five chapters, which deal with applications of magnetic resonance to enzymatic studies, studies of protein structure, studies of DNA conformation and dynamics, and also studies dealing with water relaxation in biological systems. The chapter titles and authors are as follows: Chapter 1—*Isotope Effects on Phosphorous Chemical Shifts: Applications to Enzyme Mechanisms* by C. W. DeBrosse and J. J. Villafranca; Chapter 2—*Spin-Lable Probes of Enzyme Action* by M. W. Makinen and L. C. Kuo; Chapter 3—*DNA Backbone Conformation and Dynamics* by H. Shindo; Chapter 4—*Observations of Amino Acid Side Chains in Proteins by NMR Methods* by J. S. Cohen, L. J. Hughes and J. B. Wooten; and Chapter 5—*Water Relaxation in Heterogeneous and Biological Systems* by L. J. Lynch.

Chapter 4 (118 pages) is particularly noteworthy because it gives a thorough account of the application of NMR spectroscopy to the motional studies of amino acid side chains, evaluation of NMR titration curves for various amino acid proteins, detailed information about the modifications (specific enrichments) and behavior of specific amino acids, and recent applications of new NMR techniques to the study of proteins.

The references in this volume typically extend through 1981. The book is filled with excellent figures and tables. One can gain an appreciation of the content of each chapter in the book by simply browsing through the detailed outline provided before that chapter. This is a book well worth purchasing.

Killian Dill, *Clemson University*

**Polywater.** By Felix Franks (University of Cambridge). The MIT Press, Cambridge, MA. 1981. xi + 208 pp. \$5.95.

Professor Franks, an acknowledged member of the "Water Club",

provides a lively and objective insider's view of the polywater story. The book covers the story from the "discovery" of polywater by Fedyakin in the Soviet Union in 1962 to the demise of the notions concerning the existence of this fictitious substance by 1973.

The polywater story catches science at one of its most vulnerable and unusual moments—the verge of a possible revolution. Professor Franks describes in a crisp, nontechnical manner the complex interactions of the personalities involved: the skeptics, the believers, the scientific editors, and the lay press. He reveals the mistakes, the anguish, and the eventual triumph of the scientific method.

The book should be of interest to anyone who wishes an intimate view of science at work.

Frank M. Etzler, *East Carolina University*

**Water.** By Felix Franks (University of Cambridge). The Royal Society of Chemistry, London. 1983. v + 96 pp. \$2.50.

Professor Franks, well known for his earlier editorship of his seven-volume series, "Water: A Comprehensive Treatise" (Plenum Press), attempts in this short book to provide a brief overview of the current state of knowledge concerning water; in particular, the unusual physical properties of water and their role in aqueous solution reactions and stabilization of biologically important structures as well as the role of water in the environment are reviewed. A shortcoming of the work is that it does not contain a list of primary references; only references to appropriate chapters in the comprehensive treatise are made.

The review, while brief, provides a suitable introduction to water for those new to the field or those seeking perspective. In particular, this book appears to be highly suitable for use as a supplementary text for students of biochemistry, chemistry, and related areas. The book is in no way a replacement for "Water: A Comprehensive Treatise", rather, it is almost an introduction to this work.

Frank M. Etzler, *East Carolina University*

**Monographs in Modern Chemistry. Volume 13. Stereospecificity in Organic Chemistry and Enzymology.** By J. Reley (Institut für Organische Chemie) and J. A. Robinson (University of Southampton). Verlag Chemie, Weinheim; Deerfield Beach, FL; Basel. 1982. xii + 324 pp. \$86.30.

Reley and Robinson have done a commendable job in assembling and presenting a well-organized review of recent applications of stereochemical methods to the study of enzyme-catalyzed reactions. Although the first chapter (Definitions and Nomenclature) is rather terse (11 pages) and frequently unclear, subsequent chapters more than make up for this deficit. Organization is by chemical reaction type and cofactor involvement rather than by stereochemical similarity, making it particularly easy to locate specific reaction examples in the text. Chapters are presented on NAD(P)<sup>+</sup>-dependent redox reactions, flavin-dependent redox reactions, aldol and Claisen condensations, biotin-dependent carboxylations, pyridoxal phosphate-dependent reactions, Coenzyme B12-dependent rearrangements, terpenoid biosynthesis, addition-elimination reactions, and phosphoryl group transfers. Most chapters begin with an introductory section, clearly outlining the stereochemical and mechanistic problems associated with a given set of reactions. Stereospecific methods of synthesis (both chemical and enzymatic) of the substrates and stereochemical methods of analysis of the products are discussed in reasonable detail. Where appropriate, the authors discuss the relationships between enzyme mechanism and the stereochemical course of the reaction. Two of the chapters end with a brief "conclusions" section, which attempts to summarize overall consistency (or the lack thereof) in the stereochemical course of particular enzyme reaction types. This section would have been a welcome addition to the other chapters. This monograph would make a valuable addition to any reference library.

Hiram F. Gilbert, *Baylor College of Medicine*

**Applications of Mass Spectrometry to Trace Analysis.** Edited by S. Facchetti (Ispra Joint Research Centre). Elsevier Scientific Publishing, Amsterdam. 1982. x + 321 pp. \$78.75.

First, a caveat concerning the title: trace analysis in this book refers almost exclusively to trace organic analysis, not trace elements, in spite of the Library of Congress indexing under trace element analysis. Only one of the 17 chapters deals with elemental analysis, and that for only one metal (lead).

This book takes its form from a series of lectures given in 1980 in Italy at the Ispra Establishment of the Joint Research Centre of the European Communities. These invited lectures constituted a course on mass spectral identification of contaminants. One problem in 1983 considering papers from this conference held in 1980 is the short half-life that the papers may have. Mass spectrometry is one of the more dynamic fields in chemistry today. What was au courant a few years ago may now have been superseded by the latest ionization methodology. This is not simply

a trendy shift to the latest techniques. Mass spectrometry instrumentation is too expensive to permit such luxury. Rather, it results from the new developments providing greater sensitivity, selectivity, or problem solving capability. In any case, the focus of this book on GC-MS could be misleading to those who are not aware of the more recent literature.

This aside, the book has much that can be said for it. The editor has divided the resulting papers into three general sections: first, a summary of separation and sample preparations; second, a review of GC-MS for trace analysis; and third, specialized and miscellaneous applications. The first section consists of four papers (the first three translated from the German of a previous book) that provide useful collected information on sample treatment. These procedures would be of particular interest to newcomers to the field and might even interest the more experienced investigators. The middle section of seven papers treats recent (1980) trends and developments in GC-MS, including capillary methods and negative chemical ionization. It is a solid group of contributions by respected practitioners. The third section of six papers describes various specialized applications, including the analysis of dioxin and halocarbons. Treatment of stable isotope studies, as well as data collection and storage, are also present. One paper repeatedly refers to trace organic compounds as "trace elements", which could confuse a few people (such as the reviewer).

The sample preparation and separation information may make this book valuable to many laboratories. The reviews of GC-MS are also useful for those scientists whose work depends heavily on this technique. Someone just getting into mass spectrometric trace organic analyses could do a lot worse than begin by reading this book.

W. W. Harrison, *University of Virginia*

**The Total Synthesis of Natural Products. Volume 5.** Edited by John ApSimon (Carleton University, Ottawa). John Wiley & Sons, New York. 1983. ix + 550 pp. \$60.00.

The series "The Total Synthesis of Natural Products" has become an outstanding contribution to the field of natural product synthesis. In his earlier chapter of Volume 2, Heathcock reviewed the total synthesis of sesquiterpenes from 1923 to the middle of 1970. Over this 47 year time span he found 311 papers dealing with the total synthesis of sesquiterpenes. In Volume 5, which covers the 10 years from 1970 to 1979, Clayton H. Heathcock, Samuel L. Graham, Michael C. Prrung, Frank Plavac, and Charles T. White have reviewed 550 papers on the synthesis of over 260 sesquiterpenes and sesquiterpene alkaloids.

Volume 5 follows the same organizational scheme used in Volume 2. The sesquiterpenes are grouped according to the number of rings, i.e., acyclic, monocyclic, bicyclic, etc. Sesquiterpene alkaloids, although not included in Volume 2, are now considered in the last section of this new book.

For each synthesis, or variation on a synthesis, the authors have included a reaction scheme showing the reagents needed for the conversions. The text gives information about yields, both low and high, and isomeric mixtures where they have significance to the synthesis. Mechanisms are included where they are needed to explain the stereochemistry of the reactions.

Although there is no author index, the general index does include both compound and reagents, making this volume very useful for those working in synthetic chemistry. One is impressed with the number of new reagents and synthetic methods that have been developed in the past 10 years. With 350 references, this volume is an excellent addition to the series; however, one wonders whether the reviewers will be able to keep up with this rapidly expanding field.

James G. Macmillan, *University of Northern Iowa*

**Pollution Engineering and Technology Series. Volume 21. Carbonaceous Adsorbents for the Treatment of Ground and Surface Waters.** By James W. Neely and Eric G. Isacoff (Rohm and Haas Co., Spring House, PA). Marcel Dekker, Inc., New York. 1982. viii + 228 pp. \$39.75.

This book reviews all the studies done from 1974 to October of 1981 with Ambersorb XE-340 (Rohm and Haas Co.) for the removal of organic contaminants in water. The year 1974 was also that in which the Environmental Protection Agency first recognized the existence of potentially harmful concentrations of such pollutants in drinking water supplies.

The organic contaminants of principal interest are the chlorinated hydrocarbons, the sources of which are industrial wastes (chlorinated solvents), water treatment procedures (the products of chlorination of naturally occurring humic materials), agricultural runoff (chlorinated pesticides), and waste disposal sites (all of the above classes of chlorinated hydrocarbons plus polynuclear aromatics and polychlorinated biphenyls). The principal means for removal of the lower molecular weight contaminants are aeration (75 to 95% reduction) and adsorption. Adsorption is accomplished by granular activated carbon (GAC) and synthetic

carbonaceous adsorbent such as Amberborb XE-340. Regeneration of adsorbents is accomplished by solvents or steam, or a combination of both. Aeration followed by adsorption may be employed.

Comparisons of GAC and Ambersorb XE-340 indicate a greater variability of pore size and reactivity in GAC. Ambersorb XE-340 is a carbonaceous hydrophobic adsorbent consisting of hard, shiny, black, spherical, 20-60-mesh beads based on the carbonization of macroreticular (macroporous) styrene divinyl benzene copolymers which have been rendered infusible by sulfonation. Upon heating in an inert atmosphere, sulfonate hydration water is lost between 100 and 200 °C. Carbonization occurs on heating above 300 °C, with the sulfur being lost as SO<sub>2</sub> and H<sub>2</sub>S. The macroporous structure of the copolymer is retained in the resulting polymer carbon. The macropores are 100 to 350 Å, while the micropores range from 6 to 40 Å with an average of 15 Å. Performance characteristics are controlled by optimization of such adsorbent properties as macropore and micropore sizes, and chemical composition and structure.

The format of the book divides the topics under the general headings of production of safe drinking water, discussion of polymer carbon adsorbents, principles of physical adsorption, laboratory operations and engineering data, and surface and ground water purification with polymer carbon adsorbents. Each division has its own set of references. The Index serves to cross-reference material common to two or more of the divisions.

As the authors state in the Preface, Ambersorb XE-340 represents the only known alternative to activated carbon for the purification of drinking water by adsorption methods, and this book presents a complete collection of all the studies done with Ambersorb XE-340 to the literature cut-off date.

Jack L. Lambert, *Kansas State University*

**Progress in Mass Spectrometry. Volume 4. Fundamental Aspects of Organic Mass Spectrometry.** By Karsten Levsen. Verlag Chemie, Weinheim and New York. 1978. 312 pp. \$60.00.

For some 30 years, a debate has simmered within the mass spectrometry community concerning the rules that govern the fragmentation of the ions that are formed in the source of a mass spectrometer. Those concerned with the application of mass spectrometry to qualitative organic analysis have pursued a largely empirical, "mechanistic" approach, based upon structural stability and bond lability, as surmised by analogy with solution chemistry. Other workers, taking a more fundamental view, have sought to explain mass spectra from a theoretical standpoint, and the centerpiece of this work is usually felt to be the Quasi-Equilibrium Theory (QET) that emerged in 1952 from the Eyring school in Utah.

Karsten Levsen's book is devoted to a presentation of all significant aspects of the QET and includes a lengthy consideration of the mechanistic theory, particularly the common ground it shares with the QET.

As befits a physical chemist who has made some significant contributions to tests of the validity of the QET, Levsen offers a treatment that is informed, exhaustively detailed, and well balanced. While his commitment to the QET is clear, he nevertheless does not ignore its difficulties (the problems of obtaining the data necessary for QET calculations and the frequent need for approximations, for example) and freely concedes that the mechanistic approach, whether one is comfortable with it or not, "...is still used with great success... (and) is in general not in contradiction with the QET".

The only criticism of the book concerns its English. It is of course a major undertaking for anyone to write a book, especially one on this subject, in anything but one's native tongue, and Levsen should be congratulated for having done so well. There are, however, frequent non-idiomatic or anti-idiomatic phrases, and these do not help when comprehension itself may be a problem. Further, the book's production is poor. It is routinely offset from a typewritten manuscript, with a ragged margin and inexplicable hyphenations, such as e-lectron.

But these are minor problems; the book is a valuable addition to the libraries of those chemists and physicists whose interests lie in the unimolecular behavior of excited organic molecules.

G. W. A. Milne, *National Institutes of Health*

**Natural Product Chemistry—A Mechanistic and Biosynthetic Approach to Secondary Metabolism.** By Kurt B. G. Torssell (Chemical Institute, University of Aarhus). John Wiley and Sons, New York. 1983. xiii + 401 pp. \$54.95.

This remarkably lucid volume deals with the biosynthetic formation of various natural products and includes work through the end of 1981. After an introductory chapter, there are seven others as follows: (1) carbohydrates and primary metabolites, (2) the shikimic acid pathway, (3) the polyketide pathway, (4) the mevalonic acid pathway (terpenes), (5) amino acids, peptides, and proteins, (6) alkaloids, and (7) N-heteroaromatics. Consequently, the author has included a very wide array of chemical families while avoiding an encyclopedic treatment of

the subject matter. In addition, biosynthetic sequences with the usual "no mechanism" steps that make true organic chemists shudder have been kept to a minimum. "Electron pushing" is used throughout and, except for a few cases where there were errors (as on pages 134, 280, and 302) or too much happening for one step (as on pages 66, 73, 148, 189, 247, 249, 257, 276, and 281), is well done. There were very few spelling errors (one on page 65 and one on page 167) and only one structure was incorrect (dehydromesembrine was named mesembrine on page 291). In addition, the use of numbers in parentheses in the body of a paragraph to refer to an equation, especially when the number followed the name of a compound, was confusing at first since this is not the usual convention.

There are problems at the end of each chapter except the first and the last. These are accompanied by literature references as well as answers at the back of the book. This makes the volume useful for an advanced course in natural products chemistry. All in all, the author has done a very good job.

Harold W. Pinnick, *Bucknell University*

**B<sub>12</sub>. Volume 1. Chemistry. Volume 2. Biochemistry and Medicine.** Edited by David Dolphin (University of British Columbia). John Wiley and Sons, New York. 1982. Volume 1: xiv + 671 pp. Volume 2: xiv + 505 pp. Two-volume set, \$130.00.

These two superb volumes contain virtually every facet and detail of the chemistry and biochemistry of B<sub>12</sub> known up to 1980—in some cases through 1981, as many of the chapters include important material not previously available in the original literature. Though titled "B<sub>12</sub>: Biochemistry and Medicine", Volume 2 covers the medical aspects of B<sub>12</sub> such as pernicious anemia and methylmalonyl acidemia in far less detail than other chapters deal with the biochemistry. Accordingly, the work will be more valuable for chemists and biochemists than for clinical hematologists.

In all there are 29 chapters, each written by an acknowledged expert. To review each of them in detail would exceed acceptable length for these comments; to mention only some chapters suggests, quite wrongly, that others are less worthy of praise. Nevertheless, I personally found particularly interesting those on the history of B<sub>12</sub> (I-3), the biosynthesis of the corrin macrocycle (I-4), the total synthesis of vitamin B<sub>12</sub> (I-6), the NMR spectroscopy of cobalimins (I-13), the four chapters (I-9, -10, -14, -15) dealing with the chemistry, both observed and theoretical, of the carbon-cobalt bond and of B<sub>12</sub> model systems, and the splendid series of chapters in Volume 2 (II-7-14) on the various biochemical transformations involving B<sub>12</sub> as a cofactor. The authors paid very thoughtful attention, throughout most of the mechanistic discussions, to the challenging, as yet unanswered, questions about B<sub>12</sub> chemistry and biochemistry; mystery still abounds both as to the fundamental chemical mechanisms as well as to the catalytic aspects of the reactions involved.

Many of the chapters present experimental details of recent studies so that the determined student of the subject can gain not only the historical background but also the directions being taken in current research. Results of yet later studies will lead to modification of some of the conclusions presented, but this reflects much more the presently vigorous advance of the field than any avoidable defect in such a collection of up-to-date contributions.

One should particularly compliment the editor for his directorial skills and his contributing authors for their cooperation in avoiding a frequent pitfall of works of this type—in these volumes there is neither endless repetition of introductory material nor its absence where appropriate. They have been handsomely and carefully produced (unfortunately leading to a price that will keep them off most Christmas lists) and they set a very high standard for what promises to be a series of exceptional merit on coenzymes and cofactors.

John H. Richards, *California Institute of Technology*

**Vibrational Intensities in Infrared and Raman Spectroscopy, Studies in Physics and Theoretical Chemistry. Volume 20.** Edited by W. B. Person and G. Zerbi. Elsevier Scientific Publishing Company, Amsterdam and New York. 1982. xv + 466 pp. \$104.75.

This book consists of five major sections and twenty chapters. The main sections are titled: Introduction, Theory of Infrared Intensities, Raman Intensities, Predictions of Vibrational Intensities, and, finally, Applications of Vibrational Intensities. Altogether, there are 21 contributors.

In the first chapter, Crawford points to a "renaissance" of interest in the problem of vibrational intensities which has occurred during the decade of the 1970's and continues. This first chapter provides a useful survey of the history of the problem. The other two chapters in the introductory section outline the general methods in theory and experiment.

The second and largest section of the book addresses the theory of

infrared intensities. A number of approaches are considered; they range from parametrically based methods to estimates based upon approximate quantum mechanical calculations. There is sufficient variety of material and approach to satisfy a number of tastes. The third section on Raman intensities stresses parametric methods and experimental techniques. The fourth section, devoted to the prediction of vibrational intensities, discusses (a) transfer of atomic polar tensors and (b) electrooptical parameters. Finally, the last section contains chapters that address the applications of vibrational intensities. The applications range from planetary atmospheres to band contours in the liquid and solid state.

A sound knowledge of the lity of vibrational spectroscopy (as in Wilson, Decius, and Cross) is required in order to understand this book. Thus, I would say this book is well beyond the immediate grasp of the average, beginning graduate student who has not yet mastered the steps. Equally, the text is, for the most part, out of the reach of the investigator from another area who is not at once well-schooled in vibrational and Raman spectroscopy and the theory. Otherwise, for those who "know", this volume should be of value.

As far as the layout of the book is concerned, I have never liked photoreproduced typescript; for the price of this book, such a mode of printing does not give full value for the money. As the writing of the book was a many-jointed effort, there is a fair amount of restatement, especially with reference to the equations that are used for the intensity of absorption. Although it is only a minor irritant, one does get tired of essentially the same preface in so many chapters. In the third chapter, Zerbi makes the mistake of assigning only the adiabatic electronic energy (as calculated for a "frozen" configuration in the Born-Oppenheimer approximation) as the potential energy for the vibrational problem. Ignored are the contributions of matrix elements which involve the nuclear kinetic energy operator. The article is saved (as usually happens) by the author's immediate leap into the comforting embrace of the parametric harmonic oscillator approximation. Born and Oppenheimer are not further offended.

Overall, I believe that this book is a useful volume to be included in a general library collection. The price makes it generally prohibitive for purchase by the typical impecunious academic who must rely upon personal sources of support.

P. P. Schmidt, *Oakland University*

**Dictionary of Organic Compounds. Fifth Edition. First Supplement.** Edited by J. Buckingham. Chapman and Hall, London. 1983. xi + 796 pp. \$175.00.

The editors and publishers are to be commended for the timeliness of this supplement to the main work that appeared only late last year. Its main strength lies in all the new compounds listed, but there is much more than just that. There is hardly a page that does not have an "Updated Entry" replacing an original entry. They serve to present new, more recent (well into 1982) references and new data derived from them. It is helpful that the entire entry is repeated so that one does not have to look in two places, so long as one starts with the supplement. Correction of errors in the main work will presumably begin to appear in the subsequent supplements. A general new feature is the recalculation of molecular weights which are now given to three decimal places. This is evidence of continuing efforts for improvement and is most gratifying.

Among the many improvements of the Fifth Edition over the Fourth is the structural formulas. There are no longer any confusing dots used for bonds. The new system is to draw single-bond lines to sp<sup>3</sup> carbons denoted by angles of straight lines, but to omit them when a group is joined to an sp<sup>2</sup> carbon. May we hope that the next step will be to use lines for all bonds to rings, and so avoid such infelicitious structures as that shown for diphenyl ether on page 155?

This supplement has its own name, formula, and CAS Registry Number indexes, which represent no mean effort. Finally the DOC seems to be strongly bound and printed on paper of good quality, important features for a work that will see a lot of use.

**Chemical and Biological Generation of Excited States.** Edited by Waldemar Adam and Giuseppe Cilento. Academic Press, New York. 1982. 388 pp. \$59.50.

This text is the written report of a (Joint Brazil-U.S.) conference held in August 1978 on various aspects of the production and reactions of excited states. In particular, the emphasis of the book is placed on the involvement of excited states in systems of importance in chemistry, physics, biology, and medicine. This is rather a broad-reaching concept, but the text makes a valiant effort to achieve its aim, via eleven reviews divided as chapters by different authors, on various aspects of excited-state chemistry that are of general interest. The eleven chapters cover various aspects of the physics and chemistry of excited states and the luminescence that often accompanies them. The first chapter gives a brief rundown on some of the physics behind excited states. It sets the

tone for subsequent chapters, but for details, one has to refer to standard texts on spectroscopy of excited states. Chapters 2, 3, 4, and 5 are really a discussion of various chemiluminescent systems. In particular, dioxetane systems, and the chemistry associated with these systems, mode of preparation, etc., are discussed. This is probably the major part of the book, and perhaps it is overemphasized at the expense of some of the other excited-state systems. A subsequent chapter deals with electrochemiluminescence and describes the basic concepts of the process, the experimental techniques used, and a discussion of reaction pathways. A chapter dealing with chemically initiated electron exchange luminescence provides a good backup for the prior discussion of electrochemiluminescence. It extends the discussion of chemiluminescence to systems other than dioxetane such as peroxides, and thus makes a significant contribution to the wealth of the text. Other chapters deal with the mechanism of bioluminescence and various electronic excitation in dark biological processes, biochemical excitation, chemiluminescence from biological oxidation reactions, and finally a chapter on the role of singlet oxygen in biological processes. One tends to have an uneasy feeling after reading the text that possibly the continual generation of texts on conferences leaves much to be desired, unless a discussion of the material is also available. For example, this text describes or outlines many of the features that arise from the generation of a few selected excited states. Just how the work reported fits into the general area of excited states is not emphasized, or indeed, just how important the area is in chemistry and biology (one has no idea what the conference achieved in respect to the material discussed); however, the reviews, although selective, are in immediate source of information to someone just entering the field, and as such the text, along with others on chemiluminescence, occupies a place on my bookshelf.

J. K. Thomas, *University of Notre Dame*

**Control of Sulfur Oxides from Coal Combustion.** By Geoffrey F. Morrison. IEA Coal Research, London SW1W OEX. 1982. 104 pp. £10.00.

The reader is referred to the review in "Mineral Effects in Coal Conversion" for general remarks. This work is a review of the recent literature on sulfur in coal, its removal by physical, chemical, and microbiological means, and desulfurisation of flue gases. The 344 references are cited with complete titles, a most helpful feature.

#### Volumes of Proceedings

**Fourth Symposium on Biotechnology in Energy Production and Conservation.** Edited by Charles D. Scott. John Wiley and Sons, New York. 1983. viii + 495 pp. \$65.00.

Proceedings of a symposium held in Gatlinburg, Tennessee, in May 1982, containing a large number of accounts and notes on original research, including one remarkably titled Energy Conservation and Methane Production...". The papers are set in type, and there are author and subject indexes.

**Energy: Money, Materials and Engineering.** By the Institution of Chemical Engineers. Pergamon Press, New York. 1983. ca. 400 pp. \$72.00.

Proceedings of a symposium held in London in October 1982, consisting of the texts of seven plenary lectures, 29 theme papers, and 12 specialist session papers, reproduced from the authors' typescripts, without an index.

**Water Activity: Influences on Food Quality.** Edited by Louis B. Rockland and George F. Stewart. Academic Press, New York. 1981. xviii + 921 pp. \$60.00.

Proceedings of an international symposium held in Osaka in 1978, consisting of 33 reports of original research, reproduced from typescript and provided with a subject index.

**Flow-Induced Crystallization in Polymer Systems.** Edited by Robert L. Miller. Gordon and Breach, Science Publishers, Inc., New York. 1979. x + 370 pp. \$42.50.

Proceedings of a symposium held in Midland, Michigan, in August 1977, consisting of 16 accounts of original research with the transcripts of the discussions that followed, provided with a real author index and a substantial subject index, all set in type.

**Molecular Ions: Geometric and Electronic Structures.** Edited by Joseph Berkowitz and Karl-Ontjes Groeneveld. Plenum Press, New York and London. 1983. xii + 594 pp. \$79.50.

Proceedings of a NATO Advanced Study Institute held in Greece in October 1980, consisting of an historical survey by A. Carrington and a large number of accounts of original research, reproduced from typescript, and provided with a substantial index.

**Block Copolymers: Science and Technology.** Edited by Dale J. Meier. Harwood Academic Publishers, New York. 1983. ix + 200 pp. \$75.00.

Proceedings of the Ninth Midland Macromolecular Meeting, held in August 1979, consisting of an introductory overview and eight accounts of original research, typeset and indexed.

**Particle Size Analysis 1981.** Edited by N. Stanley-Wood and T. Allen. John Wiley and Sons, New York. 1983. ix + 461 pp. \$74.95.

Proceedings of the fourth conference on the title subject, held in Loughborough in September 1981, consisting of a plenary lecture by B. H. Kaye, a large number of reports of original research reproduced from the authors' typescripts, and a subject index.

**Synthesis and Applications of Isotopically Labeled Compounds.** Edited by William P. Duncan and Alexander B. Susan. Elsevier Scientific Publishing Co., Amsterdam and New York. 1983. xxviii + 508 pp. \$110.75.

Proceedings of an international symposium held in Kansas City in June 1982, consisting of a large number of reports of original research, reproduced from typescripts, and lacking an index.

**Chromatography in Biochemistry, Medicine and Environmental Research. 1.** Edited by Alberto Frigerio. Elsevier Scientific Publishing Co., Amsterdam and New York. 1983. x + 278 pp. \$72.25.

Proceedings of the 1st International Symposium on the title subject, held in Venice in June 1981, consisting of a large number of accounts of original research, reproduced from typescript, and without an index.

**Current Trends in Organic Synthesis.** Edited by H. Nozaki. Pergamon Press, New York. 1983. xii + 429 pp. \$90.00.

Proceedings of the Fourth International Conference in Organic Synthesis, held in Tokyo in 1982, and consisting of 33 papers reproduced from typescripts. Some are very short (e.g., 2 pages of text and 2 pages of reaction schemes), and some are substantial reviews. Editorial control is very loose; one long paper has no list of references, for example. Contains an index and a list of financial contributors.

**Photon Correlation Techniques in Fluid Mechanics.** Edited by E. O. Schulz-DuBois. Springer-Verlag, Berlin, Heidelberg, and New York. 1983. x + 398 pp. ca. \$33.00.

Proceedings of a conference held in Kiel, Germany, in May 1982, consisting of 43 accounts of original research, reproduced from the authors' typescripts, and without a subject index.

**Desorption Induced by Electronic Transitions DIET I.** Edited by N. H. Tolk, M. M. Traum, J. C. Tully, and T. E. Madey. Springer-Verlag, Berlin, Heidelberg and New York. 1983. xi + 269 pp. ca. \$29.50.

Proceedings of the First International Workshop on the title subject, held at Williamsburg, Virginia, in May 1982, consisting of 27 accounts of original research reproduced from a wide spectrum of typescripts, and not indexed.

**Chromatography and Mass Spectroscopy in Biomedical Sciences. 2.** Edited by Alberto Frigerio. Elsevier Scientific Publishing Co., Amsterdam and New York. 1983. xii + 506 pp. \$106.50.

Proceedings of an international conference held in Bordighera, Italy, in June 1982, consisting of four plenary lectures, and a large number of reports of original research reproduced from the authors' typescripts, and no index.

**Coordination Polymerization.** Edited by Charles C. Price and Edwin J. Vandenberg. Plenum Press, New York and London. 1983. x + 331 pp. \$42.50.

Proceedings of a symposium held at the national meeting of the American Chemical Society in Atlanta, Georgia, in March 1980, consisting of a specially written review on Selectivity in Addition Polymerization, by C. C. Price, a lecture by the award winner, Edwin J. Vandenberg, on Coordination Polymerizations, and 13 accounts of original research, reproduced from the authors' typescripts, and provided with a subject index.

**EXAFS and Near Edge Structure.** Edited by A. Bianconi, L. Inocchia, and S. Stipcich. Springer-Verlag, Berlin, Heidelberg, and New York. 1983. xii + 420 pp. \$35.00.

Proceedings of an international conference held at Frascati, Italy, in 1982, consisting of a large number of accounts of organized research, reproduced from varied typescripts, and not provided with an index.

**Copper Coordination Chemistry: Biochemical and Inorganic Perspectives.** Edited by Kenneth D. Karlin and Jon Zubieta. Adenine Press, Inc., Guilderland, NY. 1983. xii + 495 pp. \$69.00.

Proceedings "inspired by the First SUNYA Conversation in Copper Coordination Chemistry", held in June 1982, consisting of 23 papers that

are well-edited accounts of original research, set in type, and provided with a short subject index.

**Physicochemical Aspects of Polymer Surfaces (2 Volumes).** Edited by K. L. Mittal. Plenum Publishing Co., New York and London. 1983. 1250 pp. \$130.00/set.

Proceedings from an international symposium held at the national meeting of the American Chemical Society in New York, August 1981. The large number of accounts of original research are grouped under the headings: Spectroscopic Analysis; Contact Angle, Wettability and Surface Energetics; Reactions and Interactions at Polymer Surfaces; Tribology and Triboelectrification; Adsorption and Adhesion; Modification of Polymer Surfaces; and Polymer Metal Interfaces. The papers are reproduced from the authors' typescripts and there is a substantial subject index.

**Intramolecular Dynamics.** Edited by Joshua Jortner and Bernard Pullman. D. Reidel Publishing Co., Dordrecht, Boston and London. 1982. ix + 559 pp. \$74.00.

Proceedings of the Fifteenth Jerusalem Symposium on Quantum Chemistry and Biochemistry, held in 1982, consisting of a large number of accounts of original research, reproduced from the authors' typescripts, and provided with a substantial subject index.

**Maize: Recent Progress in Chemistry and Technology.** Edited by George E. Inglett. Academic Press, New York. 1982. ix + 251 pp. \$23.50.

Proceedings of a symposium held in Prague in 1982, consisting of 16 papers on original research, reproduced from the authors' typescripts, and provided with a short subject index.

**Mobility and Function in Proteins and Nucleic Acids.** Edited by R. Porter, M. O'Conner, and J. Whelan. Pitman Press, London. 1983. x + 357 pp. \$35.00.

Proceedings of CIBA Foundation Symposium 93, held in London in March 1982, consisting of 16 reports of original research and the discussions that followed them, a "summary and outlook", and a substantial subject index, all set in type.

**Static and Dynamic Properties of the Polymeric Solid State.** Edited by R. A. Pethrick and R. W. Richards. D. Reidel Publishing Co., Dordrecht, Boston, and London. 1982. xiv + 475 pp. \$56.50.

Proceedings of a NATO Advanced Study Institute held in Glasgow in September 1981. It contains the text of 15 review lectures and the abstracts of five seminars, reproduced from the authors' typescripts, and provided with a subject index.

**Design '82.** By the Institution of Chemical Engineers. Pergamon Press, New York. 1983. 381 pp. \$63.00.

Proceedings of the Institution of Chemical Engineers "EFCE event no. 265", held in Birmingham, UK, in 1982, consisting of papers reproduced from typescripts, and not indexed.

**Chemistry and Biology of Hydroxamic Acids.** Edited by Horst Kehl. Karger, Basel, Switzerland. 1982. xii + 192 pp. \$142.50.

Proceedings of an international conference held in Dayton, Ohio, in May 1981, consisting of 21 accounts of original research and an overview lecture, set in type, and provided with a subject index.

**Petroanalysis '81: Advances in Analytical Chemistry in the Petroleum Industry.** Edited by G. B. Crump. John Wiley and Sons, Inc., New York. 1983. xiv + 456 pp. \$83.95.

Proceedings of a symposium organized by the Analysis Sub-committee of the Institute of Petroleum in October 1981, consisting of a large number of accounts of original research reproduced from typescripts, and provided with a substantial index.

**Adhesion Aspects of Polymeric Coatings.** Edited by K. L. Mittal. Plenum Publishing Co., New York and London. 1983. xii + 657 pp. \$85.00.

Proceedings of a symposium held in Minneapolis in 1981 under the auspices of the Electrochemical Society, consisting of five review lectures, and a large number of accounts of original research, and a substantial subject index.

**Short-Term Bioassays in the Analysis of Complex Environmental Mixtures.** III. Edited by Michael D. Waters, Shahberg S. Sandhu, Joellen Lewtas, Larry Claxton, Neil Chernoff, and Stephen Nesnow. Plenum Publishing Co., New York and London. 1983. xv + 589 pp. \$69.50.

Proceedings of a symposium held at an undisclosed date and place, consisting of a large number of accounts of original research reproduced from uniform typescript and provided with a substantial index.

**Ab Initio Calculation of Phonon Spectra.** Edited by J. T. Devreese, V. E. Van Doren, and P. E. Van Camp. Plenum Publishing Co., New York and London. 1983. viii + 303 pp. \$42.50.

Proceedings of the CECAM workshop on the title subject held in Antwerp in June 1981, consisting of 13 accounts of original research, reproduced from the authors' typescripts, and provided with a subject index.

**Ion Formation from Organic Solids.** Edited by A. Benninghoven. Springer-Verlag, Berlin, Heidelberg, and New York. 1983. ix + 269 pp. \$29.50.

Proceedings of the Second International Conference on the title subject, held at the University of Münster in September 1982, consisting of six reviews and 27 accounts of original research, reproduced from the authors' typescripts, and without a subject index.

**Trace Metals in Sea Water.** Edited by C. S. Wong, Edward Boyle, Kenneth W. Bruland, J. D. Burton, and Edward D. Goldberg. Plenum Publishing Co., New York and London. 1983. xiv + 920 pp. \$115.00.

Proceedings of a NATO Advanced Research Institute held in 1981 in Sicily, consisting of a large number of accounts or original research, reproduced from the authors' typescripts, and provided with a substantial subject index.

**Pesticide Chemistry: Human Welfare and the Environment.** Edited by J. Miyamoto and P. C. Kearney. Pergamon Press, New York, 1983. **Volume 1: Synthesis and Structure-Activity Relationships.** ix + 383 pp. **Volume 2: Natural Products.** ix + 372 pp. **Volume 3: Mode of Action, Metabolism, and Toxicology.** xi + 569 pp. **Volume 4: Pesticide Residues and Formulation Chemistry.** xi + 429 pp. \$390.00.

These four volumes are the proceedings of the IUPAC 5th International Congress of Pesticide Chemistry, held in Kyoto in 1982. The large number of papers are all reproduced from the authors' varied typescripts. Each volume has its own subject index.

**Biomedical Aspects of Fluorine Chemistry.** Edited by R. Filler and Y. Kobayashi. Co-published by Kodansha, Ltd., Tokyo, and Elsevier Biomedical, Amsterdam, New York, and Oxford. 1982. 256 pp. \$74.50.

This volume is derived from the proceedings of a symposium held in 1979 at the Joint meeting of the American Chemical Society and the Chemical Society of Japan and consists of eleven contributions, of which some are general reviews and others are essentially reports of original research. All are stated to have been brought up to date since the original presentation; they are set in type and there is a subject index.

**Biophysics of Water.** Edited by Felix Franks and Sheila Mathias. John Wiley and Sons, New York. 1983. xxv + 400 pp. \$64.95.

Proceedings of a "working conference" held in Cambridge, UK, in 1981, consisting of seven plenary lectures, many poster contributions, panel discussions, etc., all set in type, and a subject index.

**Quantum Theory of Chemical Reactions. Volume III. Chemisorption, Catalysis, Biochemical Reactions.** R. Daudel, A. Pullman, L. Salem, and A. Veillard, Eds. D. Reidel Publishers, Dordrecht, Boston, and London. 1982. vii + 178 pp. Dfl 75, U.S. \$32.50.

This book is the last volume representing the proceedings of an international symposium held in Paris for three years. It contains a chapter on theoretical background of heterogeneous catalysis, two chapters on clusters, reactivity of solid state, and a study of Fisher Tropsch synthesis. Five chapters concern biochemical reactions, such as proton transfer, a quantum/statistical study of enzyme reactivity, and intermolecular interactions and solvent effects.

**Studies in Inorganic Chemistry. Solid State Chemistry 1982. Proceedings of the Second European Conference, Veldhoven, The Netherlands 29 June, 1982.** Edited by R. Metselaar and H. J. M. Heijligers (Eindhoven University of Technology) and J. Schoonman (Rijksuniversiteit Utrecht). Elsevier Scientific Publishing Co., Amsterdam and New York. 1983. xx + 852 pp. \$202.00.

This book contains the twelve invited talks and the many contributed papers presented at the Second European Conference on Solid State Chemistry. The papers are grouped into the following topics: energy conversion and storage; defects, conduction, and diffusion; solid state reactions and synthesis, spectroscopy; magnetism; and, finally, the largest group, crystal chemistry and structure. The latest developments in the growing field of solid state chemistry research in Europe are well represented. For the high price a subject index should have been included, which would have made it a more useful reference book.