

Additions and Corrections

¹³C NMR Studies on Arsenic(III) and Antimony(III) Dihydroxydicarboxylate Complexes [*J. Am. Chem. Soc.* **1980**, *102*, 5712]. DRAGOSLAV MARCOVICH and ROBERT E. TAPSCOTT.*

Page 5713, the sixth and seventh sentences of the first paragraph should be changed to read: The first crop of crystals obtained, upon evaporation of the acetone, was racemic material while the last crop obtained was essentially pure (+)-dimethyltartaric acid. Workup of the filtrate, after removal of the quinine salt of (+)-dimethyltartrate, in a similar manner gave (-)-dimethyltartaric acid.

Classical Electrical Contributions to Solvent Polarity Scales [*J. Am. Chem. Soc.* **1981**, *103*, 6036]. S. EHRENSON.

Page 6042: Equation A7 should read:

$$W_l(w) = (-1)^{l+1} e^{-w} \sum_{k=0}^l \frac{(l+k)!(2w)^{l-k}}{k!(l-k)!} + e^w \sum_{k=0}^l \frac{(-1)^k (l+k)!(2w)^{l-k}}{k!(l-k)!}$$

Equation A8 should read:

$$V_l(w) = w^{2l} d^l (\sinh w/w)/(w dw)^l$$

The Automerization of C₁₁H₁₁ Chlorides and the Stability of Their Cations [*J. Am. Chem. Soc.* **1981**, *103*, 6530]. M. J. GOLDSTEIN,* S. TOMODA, E. J. PRESSMAN, and J. A. DODD.

The sixth letter of the Greek alphabet (ζ, zeta) is correctly indicated at the sixth carbon atom of 10. It was inadvertently replaced by the fourteenth letter (ξ, xi) in the text that follows and in Table II.

Thermal Rearrangement of an Allenic Diazoalkane and Intermolecular Capture of a Diazoethene by a Cyclopropene To Give a Common Dihydropyridazine Product [*J. Am. Chem. Soc.* **1981**, *103*, 7011]. PAUL M. LAHTI and JEROME A. BERSON.*

Page 7011, Table I: The superscript *d* should refer to the third (not the second) structural formula in the column headed "allenes", whereas the label 32^a, 20^b should refer to the second formula, not the third.

Base Catalysis in a Photochemical Smiles Rearrangement. A Case of General Base Catalysis of a Photoreaction [*J. Am. Chem. Soc.* **1981**, *103*, 7669]. GENE G. WUBBELS* and DANIEL W. CELANDER.

Page 7670: Equations 1, 2, and 4 are incorrect due to the presence of the partitioning factor, *f*, in the denominator of eq 1. The proper equations are:

$$\Phi = \Phi_{\text{ISC}} \left(\frac{k_2}{k_1 + k_2} \right) \left(\frac{k_4 + fk_5[\text{B}]}{k_3 + k_4 + k_5[\text{B}]} \right) \quad (1)$$

$$\frac{1}{\Phi} = \frac{1}{\Phi_{\text{ISC}}} \left(1 + \frac{k_1}{k_2} \right) \left(\frac{k_3 + k_4 + k_5[\text{B}]}{k_4 + fk_5[\text{B}]} \right) \quad (2)$$

$$\frac{1}{\Phi} = \frac{1}{\Phi_{\text{ISC}}} \left(1 + \frac{k_1}{k_2} \right) \left(\frac{1}{f} + \frac{k_3 + k_4}{fk_5[\text{B}]} \right) \quad (4)$$

This revision changes slightly the values of the calculated rate constants; the revised values are the following: $k_3 = 7.1 \times 10^7 \text{ s}^{-1}$, $k_4 = 1.8 \times 10^7 \text{ s}^{-1}$, $k_5^{\text{OAc}} = 2.0 \times 10^7 \text{ M}^{-1} \text{ s}^{-1}$, and $k_5^{\text{HPO}_4} = 4.6 \times 10^8 \text{ M}^{-1} \text{ s}^{-1}$.

Studies on Spin-Trapped Radicals in γ -Irradiated Aqueous Solutions of L-Alanylglycine and L-Alanyl-L-alanine by High-Performance Liquid Chromatography and ESR Spectroscopy [*J. Am. Chem. Soc.* **1982**, *104*, 830]. FUMIO MORIYA,* KEISUKE MAKINO, NOBUHIRO SUZUKI, SOUJI ROKUSHIKA, and HIROYUKI HATANO.

Page 833, caption to Figure 7, line 4: Na₂HPO₄-NaOH buffer, pH 11.5 should be replaced by H₃BO₃-NaCl-NaOH buffer, pH 9.0.

Page 833, right column, line 1: L-Alanyl-D-alanine should be replaced by L-Alanyl-L-alanine.

Nuclear Magnetic Resonance Investigation of the Spontaneous Decarboxylation of 2-Oxalopropionic Acid. 2. Species in Solution [*J. Am. Chem. Soc.* **1981**, *103*, 7609]. G. KUBALA and A. E. MARTELL.*

Page 7614: Equation 7 should read:

$$\alpha_{\text{HA}} = (10^{pK_1 - pD} + 1 + 10^{pD - pK_2})^{-1}$$

Book Reviews*

Fourier Transform Infrared Spectroscopy. Applications to Chemical Systems. Volume 1. Edited by J. R. Ferraro and L. J. Basile (Argonne National Laboratory). Academic Press, New York. 1978. viii + 311 pp. \$34.00.

The present volume on the applications of Fourier-transform infrared spectroscopy to chemical systems reflects a renaissance in the use of infrared spectroscopy that has occurred over the past decade. Due to major technological advances brought about by computer-dedicated Fourier-transform spectroscopy, infrared absorption is making deep inroads into research areas that have been either untouched, previously abandoned, or dominated by laser-Raman scattering. It is fitting then that this new methodology be given the exposure that it deserves in a book of high quality and professional character.

The first chapter by Green and Reedy on matrix-isolation FTIR spectroscopy provides an excellent introductory chapter. Both the basic principles and advantages of FTIR spectroscopy as well as the rudiments of the matrix-isolation technique are amply described. Furthermore, the matrix-isolation method is well-suited to demonstrating the advantages of the FTIR approach to obtain high-quality, high-resolution spectra of molecular samples that pose severe difficulties with more conventional approaches.

The ensuing chapters take up other topics of fundamental interest and importance and should appeal to those engaged in research, as well as in analytical applications. In the second chapter D'Esposito and Koenig describe applications of FTIR to synthetic and biological polymers. A major focus of this chapter is to demonstrate the subtractive accuracy of FTIR to obtain individual component spectra from mixtures and to eliminate unwanted solvent absorption bands. The latter technique shows particular promise for the study of biological samples in aqueous media,

*Unsigned book reviews are by the Book Review Editor.

an important area that hitherto has been problematic too due to the very strong infrared absorption spectrum of water. Infrared emission spectroscopy is described in the next chapter by Bates. This is a very difficult area of research due to weak signal strengths; however, the power of FTIR as a high light-gathering technique is most evident here. The impressive liquid nitrogen cooled interferometer chamber constructed by McDonald and co-workers for studying infrared chemiluminescence is a high point of this contribution. The following chapter by Griffiths on combining FTIR spectroscopy with gas chromatography (GC) gives a thorough description of the technical features of this approach which is rapidly gaining wide-spread usage in the chemical community. Griffiths' novel approach of dual-beam FTIR spectroscopy as applied to GC-FTIR measurement is also described. The area of high-pressure infrared interferometry is treated next by Lauer. Very little work was carried out in this area before the advent of Fourier-transform techniques due to the necessity for very small sample sizes. Considerable technical detail together with discussions of numerous spectra are provided. The area of far-infrared interferometry is reviewed up to the present by Durig and Cox in which they focus primarily on chemical applications in the study of low-frequency vibrational features and their structural implications.

The last chapter, written by the editors, ranges over a variety of topics under the heading of national technical problems. Although a few specific examples in the areas of atmospheric pollution and space exploration are discussed, a large portion of the material is devoted to discussing the potential of FTIR to contribute to these problems rather than a review of accomplishments to date.

This book is highly recommended for those interested in Fourier-transform infrared spectroscopy. It provides highly readable descriptions in basic areas of research applications which can carry those who are new to FTIR from the introductory level to practicing work. For those already-seasoned practitioners, it can serve as a valuable addition to one's research library.

Laurence A. Nafie, *Syracuse University*

Synthetic Methods of Organic Chemistry. Volume 35. By W. Theilheimer and A. F. Finch. S. Karger AG, New York and CH-4009 Basel. 1981. xviii + 838 pp. \$418.00.

With this volume, another 5-year series is completed, and in it therefore appears a cumulative index of subjects and reaction titles. This alone occupies 214 pp; it is very thorough and greatly facilitates use of Volumes 31–35. The main part of the book continues the systematically organized presentation of synthetically significant reactions that has met the test of time. Material "published between 1978 and 1980" is included, along with an appendix of supplementary references for this and earlier volumes.

The customary essay on Trends in Synthetic Organic Chemistry (5 pp) is included in the forepages; it provides a terse but interesting overview of selected developments.

Some readers may be astonished at the level to which the price has risen, and some may even suspect it to be a misprint. There is, however, a very large amount of information in condensed form on each page. The book will be a heavily used work of reference wherever organic chemists are engaged in synthesis and can be expected to improve their productivity significantly.

Masters Theses in The Pure and Applied Sciences. Volume 24. Edited by W. H. Shafer. Plenum Press, New York and London. 1980. xv + 293 pp. \$75.00.

This volume includes theses accepted by colleges and universities in the United States and Canada in the year 1979. For each thesis, the title is given, but no further information on content or depth. The entries are grouped by discipline and by university within each discipline. Over 10 000 theses are reported.

A Dictionary of Named Effects and Laws. Fourth Edition. By D. W. G. Ballentyne and D. R. Lovett. Chapman and Hall/Methuen Inc., New York. 1981. viii + 346 pp. \$20.00.

In the preface, the authors state that "the majority of entries have received some revision" and that they "have tried to avoid omission of any named effects and laws that have wide usage". Their success is, of course, a matter of subjective judgment. In the area of organic chemistry, the entries are less satisfactory than they should be, owing to the lack of equations in many of them. "Definitions" of such terms as "Curtius rearrangement" and "Kolbe reaction" without showing them in equation form are nearly useless. The selection of named reactions is very much out of data and is largely composed of nineteenth century chemistry. Such terms as Woodward–Hoffmann rules are ignored. Apart from these omissions, the book contains a lot of useful information, although the brevity of the entries sometimes leaves the reader with a residue of unrequited desire. There is a useful appendix of named units and a table

of organic compounds giving the systematic equivalents of traditional names. The latter, however, starts out with a most unfortunate typographical error, such that acetaldehyde is given as a synonym for ethanol. Many of the other entries are highly questionable, such as diethyl as a synonym for butane and *c*-butylamine for cyclobutylamine. Several structures, such as those for indole and phenanthroic acid, are incorrect. It is a pity that a dictionary in its fourth edition should be so unreliable.

Benzimidazoles and Congeneric Tricyclic Compounds. Part 2. By P. N. Preston, M. F. G. Stevens, and G. Tennant. John Wiley and Sons, New York. 1981. x + 581 pp. \$175.00.

This volume, together with Part 1 recently published, completes Volume 40 of the Weissberger-Taylor series "The Chemistry of Heterocyclic Compounds". It completes the task of bringing up to date the original work of Klaus Hofmann, which is now more than 25 years old.

Part 2 is primarily devoted to condensed benzimidazoles, tricyclic and higher. The subject matter of the several chapters has been reviewed comprehensively starting with the early literature and extending through publications appearing in *Chemical Abstracts* through Volume 87.

The last chapter is a very short one on Commercial Applications of Benzimidazoles. There has been much activity in using benzimidazoles as fungicides and anthelmintic agents and there is potential for use of polymeric benzimidazoles in the manufacture of fibers of high stability. An unusual feature of this chapter is the inclusion of citations to advertisements.

¹³C NMR. Edited by F. Toda (Ehime University). Sankyo Publishing Co., Jimbocho, Kanda Chiyoda-ku, Tokyo 101. 1981. xi + 280 pp.

This is a compendium of ¹³C NMR spectra, in which those of organic compounds (other than natural products) published in 17 major journals through 1977 are set out in numerical form. Each entry shows the molecular formula and structure of the compound, shifts, and coupling constants, together with the journal reference. The entries are grouped into functional categories (e.g., hydrocarbons, amines, etc.) and are arranged within each group according to complexity. A very large number of compounds are included (three to thirteen per page). Access is aided by a formula index. The convenience of having all these data in one volume and well organized should earn the gratitude of organic chemists, who will want to be sure that their libraries obtain this book. The arrangement makes it easy to scan the entries for making comparisons, as well as to find spectra of specific compounds. A volume devoted to natural products is planned.

Power Condenser Heat Transfer Technology. Edited by J. P. Marto and R. H. Nunn. Hemisphere Publishing Co., and McGraw-Hill Book Co., New York. 1981. x + 490 pp. \$47.50.

A "Workshop" on modern developments in marine condensers, held in 1980, gave rise to this volume of proceedings, which bears the subtitle "Computer Modeling/Design/Fouling". As the accumulation of nouns in the title suggests, the emphasis is strongly toward engineering problems, but some chemists may find the papers on vapor flow, condensation, and fouling of limited interest. A mini-index is included.

Organic Sulfur Chemistry. Edited by R. Kh. Freidlina and A. E. Skorova. Pergamon Press, Oxford and New York. 1981. vii + 230 pp. \$65.00.

The 16 invited lectures at the 9th International Symposium on Organic Sulfur Chemistry (Riga, Latvia, June 1980) make up the content of this volume. They are reviews of research, mostly recent, and range from sulfur compounds in petroleum to stereochemistry, heterocyclic chemistry, and sulfur–nitrogen compounds. The contributions, which are reproduced from the authors' original typescripts, are well illustrated and have extensive bibliographies. There is no index.

Organische Synthesen mit Cyansäureestern. By D. Martin and R. Balcoglu. Akademie-Verlag, DDR-/080-Berlin. 1980. 228 pp. 48 Marks.

The year 1960 saw the first report of a successful synthesis of a properly identified organic cyanate, whereas isocyanates were already well known in the 19th century. Since then, the chemistry of aryl and alkyl cyanates has developed so rapidly that the authors of the present book are able to state that it does not stand far behind that of isocyanates. A comprehensive review of this class of compound is thus timely.

Chapters are devoted to historical development, preparative methods, biochemical activity (1 page only), structure and physical properties, reactions (124 pages), and products obtainable. The reactions include attack by nucleophiles at R, O, or C of ROCN, attack by electrophiles, trimerization, isomerization, cycloaddition, etc., and constitute the heart of the book. Many specific descriptions of experimental procedures appear in the chapters on preparation and on reactions.

The references are all gathered at the end of the book, a feature that causes some inconvenience in use. However, they are arranged alpha-

etically, and the list of references thus doubles as an author index. There is also a subject index and several pages of supplementary references that extend into 1979. It is a pity that this book is paper-bound, for it is likely to see heavy use.

Biological Microcalorimetry. Edited by A. E. Beezer (Chelsea College, University of London). Academic Press, London, U.K. 1980. x + 493 pp. \$79.50.

This book is the successor to Harry D. Brown's "Biochemical Microcalorimetry" published by Academic Press in 1969. The difference in the titles of the two works is not accidental; the new volume gives considerable stress to methods and results of recent studies on intact biological systems, including tissues, isolated cells, etc. Applications of microcalorimetry to biochemical and biophysical problems receive correspondingly less attention. For example, of the 14 articles in this volume, eight deal primarily with biological matters, two with instrumentation, and four with biochemical or biophysical questions. Topics covered include growth and metabolism of bacteria, yeast, isolated mammalian cells, tissues, and organs; clinical and pharmacologic applications of calorimetry; differential scanning calorimetry of membranes and macromolecules; and advances in microcalorimetric techniques and in thermodynamic analyses of calorimetric data.

A potential problem in calorimetric studies of intact cellular systems is they sometimes focus on the phenomenology of the results obtained rather than on the interpretation, significance, and physical meaning of these results. Beezer, in his own chapter on microcalorimetric investigations of drugs, avoids this problem exceptionally well: he tries throughout to make clear precisely how and why calorimetric information is of practical utility. Most of the other chapters dealing with metabolic measurements are also reasonably successful in this regard. Wadsö's contribution on the problems involved in calorimetric measurements on cellular systems should be extremely useful to anyone contemplating experimentation in this field. Chapters by Privalov on heat capacity studies in biology and by Biltonen on thermodynamics of interacting systems are outstanding reviews which should interest many readers including those of strongly biophysical orientation.

"Biological Microcalorimetry" contains a reasonably complete subject index but, unlike its predecessor, has no author index. The volume is a useful and important reference work for all scientists interested in contemporary biocalorimetry.

B. George Barisas, *Colorado State University*

Amino Acids, Peptides, and Proteins. Volume 11. Specialist Periodical Reports. Senior Reporter: R. C. Sheppard. The Chemical Society, Burlington House, London. 1981. xxi + 552 pp. \$131.50

This Report reviews articles published during 1978, relevant to the chemistry of amino acids, peptides, and proteins. Subject coverage is similar in scope and topic to that of previous volumes. Subjects are divided into five chapters: (1) chemical, analytical and physical-chemical studies of amino acids; (2) isolation, purification, chemical and physical characterization, and chemical modification of peptides and proteins; (3) peptide synthesis; (4) structure and biological activity of hormones and related compounds; and (5) metal complexes of amino acids, peptides, and proteins. Chapter 5 covers the years 1977 and 1978.

Subject coverage is, in general, comprehensive, although several reviewers have noted that the increasing number of papers in the field forces some selectivity. The book is formatted for easy access to a given area of specialization and should serve as a valuable guide to the intended literature.

William Egan, *Bureau of Biologics, FDA*

Biomedical and Dental Applications of Polymers, Polymer Science and Technology. Volume 14. By C. G. Gebelein (Youngstown State University, Youngstown, OH) and F. F. Koblitz (Dentsply International, York, PA). Plenum Press, New York. 1981. xii + 492 pp. \$59.50

The volume contains a series of manuscripts which were presented at an American Chemical Society Symposium on Biomedical and Dental Applications of Polymers held March 23-28, 1980 at the 179th National Meeting in Houston, Texas. The 35 manuscripts are presented in four sections: (1) general biomaterial applications of polymers, (2) cardiovascular applications of polymers, (3) applications of polymers in medication, and (4) dental applications of polymers. Examples of papers in the first section are biomedical applications of polymers, pathologic processes and polymer implants, and bonding of collagen to acrylic polymers. The second section presents information on blood compatibility of polymers and the application of polymers in blood pumps, cardiovascular linings, and vascular prostheses. The third section discusses polymeric drugs, organometallic polymers as drugs, antimicrobial polymers, hydrolytic degradation of poly-DL-lactide and polymers in rate-controlled

drug delivery. The final section presents papers on the chemistry of commercial and experimental dental polymers and composites for restorative and prosthetic applications, the application of photochemistry in polymerization, the compressive fatigue properties, and the wear of polymers and composites. About half of the papers are from members of academic laboratories with the remaining studies from researchers of industrial or government laboratories. They represent the work done in the United States, Canada, England, and Italy. The broad coverage of topics should be of special interest to those researchers in the multidisciplinary fields of health and materials science. The properties of polymers in the oral and physiological environment and their interactions over time with body tissues are highly complex problems. This book sets forth the current knowledge by researchers from diverse backgrounds and should be of interest to those initiating studies in this area.

Robert G. Craig, *School of Dentistry
The University of Michigan*

Advances in Carbohydrate Chemistry and Biochemistry. Volume 37. Edited by R. S. Tipson and D. Horton. Academic Press, New York. 1980. x + 484 pp. \$49.50.

Volume 37 of the Advances comprises six chapters and an obituary of W. W. Pigman, one of the founders of this series. The first two chapters deal with monosaccharide derivatives, and are updates of chapters that appeared earlier. Thus, Chapter one, entitled Free-Radical Reactions of Carbohydrates as Studied by Radiation Techniques, by C. Von Sonntag of the Max Plank Institut in Muelheim, is an update of an earlier article that appeared in Volume 16 of this series on the behavior of carbohydrates when subjected to ionizing radiation. Two main types of reactions are discussed in the present chapter, those that take place in aqueous solutions and those that occur in the solid state. The second chapter, The Synthesis of L-Ascorbic Acid, by T. C. Crawford and S. A. Crawford of Pfizer, Inc., deals with some 12 different approaches to ascorbic acid synthesis. This is an update of F. Smith's article which appeared in 1946.

The following two chapters deal with glycoproteins. The first by J. Montreuil of the CNRS in Lille, Primary Structure of Glycoprotein Glycans: Basis for the Molecular Biology of Glycoproteins, deals with an exciting new area in carbohydrate chemistry. Less than 15 years ago, these glycans were thought to have no biological importance, but now it has become evident that specificity of glycoproteins is caused by their glycans. It also seems that glycans exist in groups, similar in structures whether found in animals, plants, or viruses, that are recognized by cells through the oligosaccharide sequence. Another interesting chapter is entitled Neoglycoproteins: The Preparation and Application of Synthetic Glycoproteins, by C. P. Stowell and Y. C. Lee of Johns Hopkins University. It discusses the preparation, properties, and applications of neoglycoproteins, modified glycoproteins obtained by such reactions as diazotization and coupling, isothiocyanate formation, amidation, amination guanidination, amidination, etc. These synthetic neoglycoproteins enable the chemist to alter the structural details of the carbohydrate portion of a glycoprotein and evaluate the effect of such a modification. One can, thus, assess the effect of replacing an epimer by another, or of introducing new functional groups, such as a halogen or an amino group, in the polymer. Chapter five by P. M. Dey on the Biochemistry of α -D-Galactosidic Linkages in the Plant Kingdom deals with the α -D-galactosides of sucrose, of polyols, and of galactolipids, as well as in polysaccharides, and in lectins.

As has become customary since 1974, to have at the end of each volume of the Advances series, a Bibliography of Crystal Structures of Carbohydrates, Nucleosides and Nucleotides is presented. This time the contribution is by G. A. Jeffrey and M. Sundaralingam.

Volume 37 of the Advances, like its predecessors, is well written and ably edited by R. S. Tipson and D. Horton. It is a must in the library of anyone interested in carbohydrate chemistry and biochemistry.

Hassan S. El Khadem, *Michigan Technological University*

The Principles of Chemical Equilibrium. By Kenneth G. Denbigh Cambridge University Press, New York, and Cambridge and London, UK. 1981. xxi + 494 pp. \$59.50 hardcover; \$19.95 paperback.

This classic textbook of Chemical Thermodynamics has now appeared in its 4th edition. Both the macroscopic thermodynamic treatment of equilibrium systems and a short (ca. 100 pages) introduction to statistical mechanics are included. All of the features which made earlier editions attractive have been retained. Many added references reflect recent contributions to the literature, and the few passages which have been rewritten with changes in emphasis are now even crisper and clearer than before.

Few students find thermodynamics to be simple, and either an overly qualitative or an excessively ascetic and formal presentation can lead to frustration. This reviewer has, since a student first acquainted him with

Denbigh's 2nd edition in 1968, been able to sample the reactions of many students to this text; their opinions have been overwhelmingly positive. Students who are just beginning their study of thermodynamics find Denbigh to be clear and understandable; those who have taken a thermodynamics course in the past and wish to review or deepen their understanding of certain topics have been enthusiastic in their praise. This reviewer himself continues to find in Denbigh a rich source of ideas and insights for his own lectures. The problems at the end of each chapter span a wide range of difficulty, from some clearly aimed at beginners to some which will provide worthy challenges to many instructors. Some teachers will want to provide their classes with additional problems at the easy end of this range. The answers given in the appendix are useful both as aids to students who seek methods of solution and as an additional source of delightful insights.

For many a student who goes on to use thermodynamics as a tool of his profession, this text will join his set of personally indispensable reference volumes; I could give no higher recommendation for any text.

Joseph L. Kurz, *Washington University*

Biological Membranes. Their Structure and Function. By Roger Harrison and George G. Lunt (University of Bath). John Wiley and Sons, New York. 1980. viii + 288 pp. \$21.95.

This paperback text is one of a series in what the publishers refer to as "Tertiary Level Biology", which is "designed for course options at this level within universities". The text contains the following chapters: The Cell; Membrane Function; Morphology of Membranes; Membrane Preparations; Membrane Components; Structural Organization; Glycoproteins, Glycolipids, and Cellular Recognition; Membrane Transport Mechanisms; Complex Membrane-Mediated Processes (ATP synthesis, photoreception, hormone receptors, etc.); and Physical Methods Used in the Study of Membranes.

The book covers most of the important areas of membranology in a logical sequence. The exposition is generally clear, although there are instances in which it could be more sharply focused.

My main criticism of the text concerns the level at which it treats the subject, which can only be described as surface level. If a student has taken a course in modern biochemistry and used an up-to-date textbook, such as the second edition of "Biochemistry" by Lubert Stryer (W. H. Freeman, 1981, \$29.95), there is not that much more that he/she will learn about the structure and function of membranes from this book. On the other hand, the student who has not taken a course in biochemistry lacks the background knowledge, especially that of protein structure, needed to read the text profitably. There are places in which the more detailed aspects of subjects are touched upon; however, my impression is that in many of these the treatment is too brief to be informative to someone unfamiliar with the subject. A minor criticism is that the text describes two outdated theories, the Davson-Danielli model for membrane structure and the ferryboat model for membrane transport systems. Since the authors recognize these theories to be disproven, there is no reason to perpetuate their existence.

Gustav E. Lienhard, *Dartmouth Medical School*

Picosecond Phenomena. Part II. Edited by R. M. Hochstrasser (University of Pennsylvania), W. Kaiser (Technische Universität München), and C. V. Shank (Bell Laboratories). Springer-Verlag, Berlin, Heidelberg, New York. 1980. xii + 382 pp. \$41.00.

This book, Volume 14 in the Springer Series in Chemical Physics, presents the Proceedings of the Second International Conference on Picosecond Phenomena held in June 1980 on Cape Cod, MA. The contents are 75 individual research papers concerned with transient events on the "picosecond" time scale and conveniently divided for the reader into eight topic categories: Advances in the Generation of Picosecond Pulses, Advances in Optoelectronics, Picosecond Studies of Molecular Motion, Picosecond Relaxation Phenomena, Picosecond Chemical Processes, Applications in Solid State Physics, Ultrashort Processes/Biology, and Spectroscopic Techniques. An author index, but not a topic index, is included.

This book provides an up-to-date, useful reference source for chemists concerned with state-of-the-art instrumentation and the results of recent experimental investigations in this field which involves, principally, lasers that produce optical pulses with duration of less than $\sim 10^{-11}$ s or so. Although many of these results are also available in other places in the technical literature, this book does provide a concentrated dose of them. While the range of topics may not be as selective as some might prefer, many will find the broad mixture of topics presented a desirable feature.

Of particular interest to chemists, there are several papers dealing with molecular motions in liquids, excited electronic and vibrational state molecular relaxation, coherence phenomena, and energy transfer. Kinetics studies on free and solvated electrons, charge-transfer complexes, proton transfer, free-radical formation, and isomerization reactions

should also be of interest. Although few in number, the papers on biological systems (mostly photosynthetic systems, visual pigments, and DNA) should also be noted here.

This book should be viewed as a valuable, but not definitive, resource for both experts and nonexperts in this rapidly changing field. More detailed analyses of the results presented in this book are most likely to be found scattered in various current technical journals. However, in general, the reports presented are detailed enough to be of real value, and the collection of so many in one book is certainly a convenience.

Gary W. Scott, *University of California, Riverside*

Physicochemical Methods for Water and Wastewater Treatment. By L. Pawlowski (Maria Curie-Skłodowska University). Pergamon Press, Inc., Maxwell House, New York. 1980. vii + 327 pp. \$50.00.

This volume presents the Proceedings of the Second International Conference held in Lublin, Poland, in June 1979. Thirty-two papers are included in this volume with the majority of the papers authored by Polish researchers. The remainder are authored by researchers from the U.S.A., Italy, Switzerland, U.K., and the U.S.S.R. All papers are written in English.

The physicochemical treatment technologies discussed in these papers include ozonation, ion exchange, electro dialysis, distillation, reverse osmosis, electrolysis, coagulation-flocculation, activated carbon adsorption, electrochemical oxidation, ultrasonic sludge thickening, and ultrafiltration with immobilized enzymes. Topics include ozone disinfection of drinking water, brackish water treatment, phosphate removal in secondary effluents, ammonia recovery from secondary effluents and nitrogen fertilizer wastewater effluents, pig farm wastewater treatment, saline mine water desalination, urban storm water treatment, and others. The papers include reviews of state-of-the-art physicochemical technologies in specific application areas, data from bench scale experimental processes, mathematical models of specific physicochemical technologies, and data from full scale processes.

The book would be of value to the researcher in the physicochemical treatment area interested in evaluating novel physicochemical treatment technologies in specific application areas.

John V. Maxham, *The Institute of Paper Chemistry*

Synthesis of Acetylenes, Allenes and Cumulenes. By L. Brandsma and H. D. Verkuijse (Rijksuniversiteit Utrecht). Elsevier, Amsterdam and New York. 1981. ix + 276 pp. \$70.25.

The eighth in a series entitled "Studies in Organic Chemistry", this volume is a laboratory manual which contains detailed procedures for the preparation of over 200 compounds, each on a convenient 100-200-mmol scale. The book is divided into eight chapters, separated into the reaction classes which are used to prepare the title functionality. The representative preparations are sufficient in scope to be of general utility for examples not directly used in the text. Over half of the preparations were independently rechecked before publication. Many detailed procedures for the preparation of organometallic reagents are also given. The volume is also well-indexed and contains references (180) to the original literature. Many notes and comments are included which explain the details of the preparations in a way that indicates the authors' extensive knowledge of the chemistry involved. Written in the clear, detailed style of "Organic Syntheses", this volume is a bargain even with the high price.

John A. Soderquist, *University of San Francisco*

Fatigue of Engineering Plastics. By R. W. Hertzberg and J. A. Manson (Lehigh University). Academic Press, New York. 1980. xv + 295 pp. \$35.50.

This is a good book. It will be valuable primarily to materials scientists and graduate students just acquiring an interest in fatigue problems. Those already well into the field will profit mostly from the extensive referencing, although many discussions are worth the time of even the most advanced investigator. A separate materials index is also a handy feature of this work.

The authors set out to correlate, to the extent possible, polymer chemistry, architecture, and processing with plastics fatigue. They have not done a bad job on this. The book is arranged into five chapters: 1, Introduction to Fatigue; 2, Cyclic Stress and Strain Fatigue: Unnotched Test Specimens; 3, Fatigue Crack Propagation; 4, Fatigue Fracture Micromechanisms in Engineering Plastics; and 5, Composite Systems. Chapter 2 deals primarily with testing and test variables—stress-controlled testing, deflection-controlled testing—and Chapter 4 contains a discussion of microfractography of fatigue failures. The other three chapters are self-explanatory. Chapter 3, which contains discussions about the effects on fatigue crack propagation of frequency, temperature, environment, load history, molecular properties, and morphology, seems especially interesting to those concerned with the properties of composites.

The style of this book is in conformity with the contemporary prosaic

norm for scientific literature reviews. The book is, in fact, much like a large review article subdivided into five smaller reviews. Consequently, its value depends more on literature citations than upon deep, clear analysis and thorough expositions of principles. Elementary theory and mathematical arguments are nowhere to be found, and that is a regrettable shortcoming in a book on this subject. Those interested in mathematical developments will simply have to look elsewhere. In this regard the book fails in part to meet its stated second aim—to wit, “to bring together bodies of literature and approaches that have tended to be restricted to particular cases and disciplines.” Even so, the book contains a lot of information and is a useful contribution to the literature of fatigue of materials.

Kenneth J. Smith, Jr., *State University of New York, College of Environmental Science and Forestry*

Porous Media: Fluid Transport and Pore Structure. By F. A. L. Dullien (University of Waterloo). Academic Press, New York. 1979. xx + 396 pp. \$42.00.

The first sentence of the preface to this book sets the tone for what is to follow. It states, “The unique property of a porous medium, the one that distinguishes it from other solid bodies on the one hand, and from simple conduits on the other, is its complicated pore structure”. For those who have wondered what lies beyond the measured coefficient (or component of a tensor) this book will be a pleasure, and it appears at a time when continuum mechanics is more than ready to incorporate the microstructure into the quest for purely predictive theoretical analysis. While petroleum engineers and hydrologists will be especially interested, anyone concerned with transport phenomena in porous structures will consider this book to be an essential addition to their library.

After a delightfully brief introduction, Professor Dullien moves on to: 2, Capillarity in Porous Media; 3, Pore Structure; 4, Single-Phase Transport Phenomena in Porous Media; 5, Selected Operations Involving Transport of a Single Fluid Phase through a Porous Medium; 6, Multiphase Flow of Immiscible Fluids in Porous Media; and 7, Miscible Displacement and Dispersion.

Chapter 2 represents a thorough review of capillary phenomena in porous media along with a discussion of some structural models and their relation to capillary pressure-saturation curves and pore size distribution functions. In Chapter 3 we find Professor Dullien in his favorite milieu leading the reader through a systematic discussion of pore structure. This chapter is the most interesting and valuable part of the book and the author's command of the subject is clearly evident. The topics range from the topology of pore structure to experimental methods, and the comparison between photomicrographic and mercury intrusion pore size distributions is an especially attractive part of this chapter.

Chapter 4 is devoted primarily to the application of Chapter 3 to studies of flow in packed beds and rigid porous media, while the latter part of Chapter 4 and all of Chapter 5 deal with a wide range of subjects. Among these are Knudsen and surface diffusion, non-Newtonian flow in porous media, filtration, reverse osmosis, and gel chromatography.

Chapters 6 and 7, dealing with immiscible and miscible displacement processes, are carefully written accounts connecting the phenomena with previous discussions of the pore structure. Both theory and experimental methods are discussed in these chapters and comparisons between theory and experimental data are presented. While largely review in nature, the treatment of immiscible and miscible displacement processes provides an attractive closure for this monograph.

Stephen Whitaker, *University of California, Davis*

Applied Headspace Gas Chromatography. Edited by B. Kolb (Perkin-Elmer Corp.). Heyden and Sons., Inc., Philadelphia, PA. 1980. x + 185 pp. \$29.00.

This text is an English translation of selected papers originally presented at the GC Headspace Symposium in Beaconsfield, England and the Second International Colloquium on Gas Chromatography Headspace Analysis in Uberlingen, West Germany, both held in October 1978. Most of these papers were initially submitted in German. Various aspects of applied headspace gas chromatography are covered in 21 chapters with a brief Foreword by the Editor, who also is the author of Chapter 1 which covers the fundamentals of headspace gas chromatography and suggests various physicochemical applications.

Headspace gas chromatography (HSGC) makes use of the equilibrium between the volatile components of a liquid or solid sample and the surrounding gas phase in a sealed vessel. The gas phase is analyzed by gas chromatography and in the case of liquid samples the concentration of solutes in the gas phase can be related through the use of Henry's law to the solute concentration in the sample. In the case of solid samples, adsorption isotherms can be established. More commonly, and especially for analytical applications, gas-phase concentrations are related to sample concentrations by means of calibration curves.

Chapters 2–21 cover a wide range of analytical applications from the determination of various toxic materials in air (carbon monoxide, formaldehyde, halogenated hydrocarbons) to medical applications which use this technique to monitor the volatile metabolic products resulting from bacterial infections.

The level of sophistication both in terms of instrumentation used and the analytical objectives vary widely from chapter to chapter as might be expected from a multiauthor text. Anyone familiar with gas chromatography could read all the chapters, however, with no difficulty. The translation appears to be quite good and this text should be of interest to anyone interested in the application of headspace techniques for the analysis of volatile organics.

Jerome W. O'Laughlin, *University of Missouri*

Applications of Photochemistry in Probing Biological Targets. Edited by A. M. Tometsko and F. M. Richards. New York Academy of Sciences, New York. 1980. ix + 502 pp. \$88.00.

This volume consists of the proceedings of a conference held in the summer of 1979. There are 33 papers and an index of contributors. Although there is no subject index, the table of contents is subdivided into six categories that help in locating a subject of interest. They are: Design and Applications of Light-Sensitive Chemicals; Probing Protein Structure and Function; Probing Membrane Structure and Function; Photoprobing Complex Protein and Nucleic Acid Targets; Photoeffects Involving Nucleic Acids; and Applications of Photochemicals in the Study of Cells and Complex Cellular Components. The term “photochemicals” used in the last category does not appear in any of the papers included in it, and one might easily come to quite wrong conclusions about what is meant (it does not mean compounds produced by light, apparently, but seems to be used for substances decomposable by light—most peculiar!). The papers are set in type, illustrations are well drawn, and lists of references are given, but some papers are hard for the outsider to follow because of arcane nomenclature; although some contributors have felt it desirable to draw the structures of such simple compounds as 4-fluoro-3-nitrophenyl azide, others leave the reader in the dark about the nature of “ethidium”, for example.

Chemists interested in nitrenes and carbenes will find much of concern to them in this book.

Laboratory Minicomputing. By John B. Bourne (Vanderbilt University). Academic Press, New York. 1981. x + 297 pp. \$27.00.

This book is really about Digital Equipment Corporation's PDP family of minicomputers, the LSI-11 microcomputer, and how they may be used in laboratory computing. Although some general theory and background information about bits, bytes, words, ASCII codes, etc. is included, this book is useful to someone who is really interested in how the PDP family of minicomputers operates. In fact, it is most useful for someone who is using a PDP-11 operating under the Bell Telephone Laboratory's UNIX operating system. This operating system and the programming language “C” are the primary software tools used in examples throughout the text. The author suggests in the introduction that “...the reader who is able to test out the examples given and perform the exercises suggested on a PDP-11 will be able to progress significantly faster than the reader without a computer”.

Topics covered include the PDP-11 instruction set, peripheral devices, bus structure, introduction to the UNIX operating system, the “C” programming language, laboratory I/O, A/D, and D/A, clocks, interrupts, and many example programs. The appendix contains a list of program listings available as supplement to the text titled Program Listing Supplement for Laboratory Minicomputing. The source code for the programs is available on 9-track tape from the author for a nominal handling and materials charge.

William M. Butler, *University of Michigan*

Fluid Catalytic Cracking with Zeolite Catalysts. By Paul B. Venuto and E. Thomas Habib, Jr. (Mobil Research and Development Corporation). Marcel Dekker, Inc., New York. 1979. 163 pp. \$19.50.

This book should be particularly useful for the chemical or petroleum-refinery engineer who seeks a thorough, broad treatment of both the engineering and chemistry of catalytic cracking with zeolites. The treatment of the chemistry of cracking and of zeolites would also serve as an authoritative introduction for chemists. It is not the purpose of the book, however, to provide a thorough review of these chemistries and the relevant research literature. Perhaps that feature which makes the book unique is its successful exposition of the interactions among feedstocks, parent crude oils, catalyst, hardware, and operating conditions. It should have special appeal to those engineers and scientists attuned to the “systems approach”.

The breadth of this work is evident from its earliest pages which treat compositions and geochemical origins of petroleum and the related

implications for the FCC process, such as trace impurities and their downstream fate. Further breadth is provided by a useful discussion of how FCC fits into a typical fuels-refinery processing scheme, including sources, preparation, and characterization of FCC feedstocks.

Separate chapters are devoted to FCC system hardware and to FCC catalysts. Even fractionation of unsaturated gases and downstream alkylation process are given some mention, in addition to the FCC riser-reactor, the regenerator, and the product fractionation system. The discussion of zeolite catalysts includes information as to their manufacture, their relationship to the older amorphous catalytic art, as well as the expected information about crystal structure, physicochemical characteristics, and their relationship to performance. Additional individual chapters are devoted to interaction dynamics of catalysts, feedstock, and hardware, as well as to chemistry and mechanism of cracking reactions. In the former chapter the treatment of restraints and limits is significant; in the latter chapter discussion of thermodynamic aspects in relation to reaction kinetics provides a valuable viewpoint.

The book is lucidly written and well documented with references. In some places it may seem somewhat terse, but then the abundant references are there for the reader who wants to find more information. The style is clear and straightforward, although sometimes the choice of adjectives and sentence structure suggests some paraphrasing from the patent literature.

This work may be expected to be consulted widely by those engaged in refinery operations, process research, and FCC catalyst development. It should also serve as a useful resource for professors and students.

Robert W. Coughlin, *University of Connecticut*

The Analytic Spirit. Essays in the History of Science. Edited by Harry Woolf (Institute for Advanced Study). Cornell University Press, Ithaca and London. 1981. vii + 363 pp. \$25.00.

This volume is a series of essays by former students and collaborators of one of the most influential of American historians of science, Henry Guerlac of Cornell University.

The first section of three chapters (67 pages) deals with The Chemical Revolution; succeeding sections are devoted to Science, Societies, and the Enlightenment (section II; 4 chapters; 90 pages), Scientific Institutions (section III; 3 chapters; 77 pages), Structure and Function in Early Modern Science (section IV; 2 chapters; 35 pages), The Revolutionary Aspects of Modern Physics (section V; 2 chapters; 31 pages), and The Supernova of 1054 (Section VI; 1 chapter; 21 pages). Of most interest to chemists will be sections I and V, and the chapter in section IV dealing with the Renaissance background to crystallography, which describes the influence of Platonic concepts and Euclidean geometry on the attempts to understand the external forms of crystals.

The politics and strategies involved in attempting to replace one set of theoretical concepts by another set of such concepts are interestingly presented in section I in chapters on (1) the origin of Lavoisier's theory of the gaseous state, (2) the triumph of those chemists who supported Lavoisier's views of the nature of combustion and of the formation of acids, and (3) the futile efforts to influence chemists to reject Lavoisier's theories made by such well-known chemists as Priestley and Baume with the chapter concentrating on the resistance to Lavoisier's views as embodied in the evolutionary chemical theory advocated by Lamarck. Chemists who recall such relatively recent scientific arguments as those involving hypoconjugation, the existence of the activated complex, and polywater will read these three chapters with perhaps some regret that scientific arguments today are conducted on such a gentlemanly level compared to those of our chemical forbears. In particular, the triumph of Lavoisier's antiphlogistic ideas are placed in better perspective, e.g., "Familiar accounts of the reception of Lavoisier's theory mislead, too, in portraying the early conversions as more sudden and straightforward than they in fact were. The passage from Fourcroy suggests that chemists reserved judgment until the advent of more conclusive experimental evidence; then the discovery of the composition of water provided the required demonstration of the superiority of Lavoisier's view. It is quite true that the water experiments were an important turning point and may have been instrumental in persuading individuals such as Fourcroy. But closer examination of the conversions of Fourcroy, Berthollet, and Guyton shows that in each case the abandonment of phlogiston was the culmination of a gradual process extending over several years or more, during which the positions of these individuals moved progressively closer to that of Lavoisier".

The titles of the chapters in section V are sufficient to whet the appetite of any chemist: How to Get from Hamilton to Schrödinger with the Least Possible Action: Comments on the Optical-Mechanical Analogy and Birth Cries of the Elements: Theory and Experiment along Millikan's Route to Cosmic Rays. Teachers who are interested in recommending to upperclass undergraduates and to graduate students a short description of how fruitful scientists think and operate will find the short chapter on Millikan (17 pages) a valuable reference; the same is true for scientists who want to acquaint nonscientists with some aspects of scientific methodology.

The individual chapters are well written and generally show sufficiently adequate background in the relevant science to allow them to deal meaningfully with the scientific concepts and experimental work considered. This reviewer enjoyed reading the book and can recommend it without reservation to fellow chemists as both entertaining and instructive.

Philip J. Elving, *University of Michigan*

Catalysis. Volume 4. Edited by C. Kemball (University of Edinburgh) and D. A. Dowden (Imperial College). The Royal Society of Chemistry, London. 1981. xiii + 253 pp. \$63.00.

As has been the case in past volumes of this "Specialist Periodical Report", "Catalysis", Volume 4, does not cover the catalytic literature for the year 1980, but rather covers the recent literature (1970-1980) in certain active areas. The editors note that in this manner they hope most of the active areas can be reviewed at least every 4 years. The editors also note that since the literature is so extensive, the authors were encouraged to be selective rather than comprehensive in their reports.

There are eight reviews in this volume as follows: The Design and Preparation of Supported Catalysts, by G. J. R. Acres, A. J. Bird, J. W. Jenkins, and F. King; Aspects of the Characterization and Activity of Supported Metal and Bimetallic Catalysts, by R. L. Moss; Metal Clusters and Cluster Catalysis, by S. D. Jackson, P. B. Wells, R. Whyman, and P. Worthington; Olefin Metathesis, by R. L. Banks; Superbasic Heterogeneous Catalysts, by S. Malinowski and J. Kijenski; Hydration and Dehydration by Heterogeneous Catalysts, by J. M. Winterbottom; Sulfided Catalysts: Characterization and Reactions Including Hydrodesulfurization, by P. C. H. Mitchell; and Carbon as a Catalyst and Reactions of Carbon, by D. L. Truin.

The Acres et al. review was written by him and his colleagues at Johnson Matthey and as such is a very basic and yet enlightening article on what most academic chemists consider a black art—heterogeneous catalyst preparation. The chapters by Moss and Mitchell update their earlier reports in Volume 1. The excellent review on olefin metathesis by Banks covers major publications during the last 4 years (266 references). As with prior volumes, the extensive number of citations in all the reviews allow only brief reference to each article. The reviews appear informative and thorough, continuing the high standards set by this series through the years.

P. E. Garrou, *Dow Chemical—New England*

Inorganic Biochemistry. Volume 2. Edited by H. A. O. Hill (University of Oxford). The Royal Chemical Society, London. 1981. xiv + 347 pp. \$100.00.

This "Specialist Periodical Report" covers 1978 and part of 1979, including more than 2000 references. The subjects of the reviews are Inorganic Analogues of Biological Molecules (C. A. McAuliffe), Storage, Transport and Function of Non-Transition Elements (M. N. Hughes), Electron Transport Proteins (P. M. Handford and W. K. Lee), Oxidases and Reductases (A. E. G. Cass and P. F. Knowles), Zinc Metalloenzymes (A. Galdes), Manganese Metalloproteins and Manganese-Activated Enzymes (A. R. McEuen), Trace Elements in Animal Nutrition (J. R. Arthur, I. Bremner, and J. K. Chesters), and Inorganic Elements in Biology and Medicine (N. J. Birch and P. J. Sadler).

Most chapters devote a few sentences to each paper. Some chapters are little more than an annotated bibliography in paragraph form. There are many illustrations, such as spectra, but usually so little explanation that the figures are not useful. In general this volume provides little perspective or connection between papers. Its principal value is to direct the specialist into the primary literature.

Daniel C. Harris, *Franklin and Marshall College*