yielding two products (**1c** and **1d**). These derivatives give a positive ninhydrin reaction and with cinnamaldehyde/HCl, blue products. On hydrolysis **1c** and **1d** yield, among the known amino acids, lanthionine and *S*-(β-aminoethyl)cysteine (thialysine), respectively, as identified by TLC.

On standing in a methanolic solution of $NaOCH_3$ (8-fold excess) at room temperature for 5–10 h **2a** is converted into **2b** and several minor products. The addition of methoxide to the α-carbon atom of Aa-3 is proved unambiguously by H NMR spectrometry: while almost all proton signals of **2b** coincide with those of **2a** (Table I), the singlets from the β-protons of Aa-3 at 4.80 and 5.12 ppm (olefinic protons) are missing. Instead, two new methyl singlets appear at 1.47 (CCH_3) and 3.16 OCH_3).

Three-dimensional models of the suggested structure **2** can be built without strain. They exhibit negative helicity of the thioether moiety in accordance with the negative Cotton effects in CD spectra as shown in Figure 1.[9]

Acknowledgment. We are indebted to Prof. W. König, Universität Hamburg, for the FAB mass spectra and to Prof. J. Dabrowski, Abteilung Organische Chemie of this institute, for providing high-resolution NMR data of phalloidin. The study was supported by the Deutsche Forschungsgemeinschaft.

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(9) Compound **2a**, accordingly, is cyclic(L-alanyl-D-threonyldehydroalanyl-*cis*-4-hydroxy-L-propyl-L-alanyl-2-mercapto-L-tryptophyl-4-hydroxy-5-mercapto-L-leucyl) cyclic(6–7)-sulfide. The name of **2b** is cyclic(L-alanyl-D-threonyl-2-methoxyalanyl-*cis*-4-hydroxy-L-prolyl-L-alanyl-2-mercapto-L-tryptophyl-4-hydroxy-5-mercapto-L-leucyl) cyclic(6–7)-sulfide.

Additions and Corrections

Elimination Reactions of *N*-(2-*p*-Nitrophenyl)ethyl)alkylammonium Ions by an E1cB Mechanism [*J. Am. Chem. Soc.* **1983**, *105*, 265–279]. JAMES R. KEEFFE* and WILLIAM P. JENCKS

Page 275, Table VII: The value of $10^3k_{OH^-}$ for 1,2-dibromo-1-(*p*-nitrophenyl)ethane should be 385 M^{-1} s^{-1}.

Boronic Ester Homologation with 99% Chiral Selectivity and Its Use in Syntheses of the Insect Pheromones (3*S*,4*S*)-4-Methyl-3-heptanol and *exo*-Brevicomin [*J. Am. Chem. Soc.* **1983**, *105*, 2077–2078]. DONALD S. MATTESON* and KIZHAKETHIL M. SADHU

Page 2077: To identify the compounds, Scheme I should have the following legend:

R: a, Pr; b,  ; c, Me; d, Bu; e, *i*-Bu; f, $PhCH_2$

R′: a, Me; b, Et

Double Isotope Fractionation: Test for Concertedness and for Transition State Dominance [*J. Am. Chem. Soc.* **1983**, *105*, 2475]. JOEL G. BELASCO, W. JOHN ALBERY, and JEREMY R. KNOWLES*

Page 2476, eq 1 should read:

$$\xi = \frac{(\phi'_{1,2})_{H''}}{(\phi'_{1,2})_{D''}} - 1 = \frac{(\phi''_1 - \phi''_2)(\phi'_1 - \phi'_2)}{(\kappa^{-1}\phi''_2 + \phi''_1)(\phi'_2 + \kappa\phi'_1)}$$

Detection of Free Radicals from Low-Temperature Ozone–Olefin Reactions by ESR Spin Trapping: Evidence That the Radical Precursor Is a Trioxide [*J. Am. Chem. Soc.* **1983**, *105*, 2883]. WILLIAM A. PRYOR,* DONALD G. PRIER, and DANIEL F. CHURCH

Page 2888: Footnote 29a omitted the numerical value for the heat of homolysis. The second line of this footnote should read: ...split to give ROO· and HO· by 10 kcal/mol....

Book Reviews*

The Theory of Vibrational Spectroscopy and its Application to Polymeric Materials. By Paul C. Painter and Michael M. Coleman (Pennsylvania State University) and Jack L. Koenig (Case Western Reserve University). John Wiley & Sons, New York. 1982. XVII + 530 pp. $60.00.

This book is both unusually honest in its definition of scope and clear in its presentation of material. It sets out to do nothing more or less than provide the reader with a concise, systematic exposition of the application of elementary vibrational spectroscopy theory to the determination of polymer structures. As the authors point out in their Preface and Chapter 1, several classic monographs are available which treat the fundamentals of nuclear vibrations in "ordinary" (monomeric) molecules. But, in spite of the extensive series of research articles and review papers by Krimm, Schactschneider, Snyder, Zerbi, and others, there is as yet no single book where the infrared spectroscopy of polymers is treated "from beginning to end". Painter, Coleman, and Koenig do so in the present text with a commendable degree of modesty, simplicity and thoroughness.

Chapters 1 through 9 present the standard theory of: internal vs. symmetry coordinates; group theory techniques; molecular force field representations; computer methods for solving secular equations; and infrared and Raman intensities. While all of these topics are discussed in many already-published texts, their present exposition is especially well-written and provides a self-contained introduction to the rest of the book. In Chapters 10 through 12 the reader is treated to a brief but comprehensive discussion of lattice dynamics and symmetry analysis of infinite (extended) systems, topics which are usually only found scattered throughout solid state physics monographs. Then, in Chapters 13 through 15, the authors "get down to business" and outline in detail the vibrational analysis of polymer crystals (mostly polyethylene) taking into account the following successively: intrachain force fields, interchain interactions, defects, chain-end effects, and local modes. Finally, no fewer than the last 150 pages of the book are devoted to exposing the nitty-gritty details of the infrared spectroscopy/molecular structure of important selected examples (polyolefins, haloethylenes, polydienes and alkenylenes, polymers containing aromatic rings, and polyamides, peptides, and proteins).

William M. Gelbart, *University of California, Los Angeles*

The Gamma Rays of the Radionuclides. By Gerhard Erdtmann and Werner Soyka (Nuclear Research Establishment Julich). Verlag Chemie, Weinheim. 1979. xv + 862 pp. $160.00.

The subtitle of this volume, "Tables for Applied Gamma Ray Spectroscopy", implies the audience to which it is intended. The book, the seventh in the series "Topical Presentations in Nuclear Chemistry", is an expanded (by 50%) and up-dated version of tables issued in 1973

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*Unsigned bood reviews are by the Book Review Editor.

as a special, 3-volume publication from Julich.

There are two tables: lines (γ-rays and X-rays) by nuclide (Table I; 274 pp) and lines by energy (Table II; 576 pp). In both tables the energies and intensities of the lines are displayed in convenient column formats. Although fewer lines are represented in the second table (12 000 vs. 48 000), it is much longer because of intentional repetition. In order to identify a component from an experimental spectrum, the reader is expected to start with Table II by selecting nuclides each having a line of approximately the search energy. This list can be narrowed considerably under constraints of half lives, modes of production, and other prominent lines shown for each entry in the energy-ordered table. Repetition of these associated characteristics is responsible for the bulk as well as the convenience of Table II. Table I is needed less frequently, but it is helpful to have it in the same volume.

H. C. Griffin, *University of Michigan*

Polymers and Their Properties. Volume 1. By J. W. S. Hearle. John Wiley and Sons, Inc., New York. 1982. 437 pp. $94.95.

This book is subtitled "Fundamentals of Structure and Mechanics" and the author states that it is his intention to concentrate on the physics involved in relating structure to mechanical and thermal responses. At first sight, this may seem to be a modest objective but, in fact, it is very broad, encompassing large portions of that subdiscipline of chemistry and physics known as polymer science.

The author has chosen to introduce a number of topics such as chain statistics, rheology, and rubber elasticity, on a fairly elementary level and then return to them in more depth later on, following a discussion of the basic thermodynamics involved in deformation and flow. This method is pedagogically sound, as discussed by the author in the preface, and should enhance the utility of the book as a text. A number of other books cover much the same ground, but the material in Chapters 6, 7, and 8, Hard Amorphous Polymers, Polymer Crystals, and Morphology and Thermomechanical Responses of Partially Crystalline Plastics and Fibres, is not readily to be found elsewhere, especially in such a well-organized and clear presentation.

In general, the strengths of the book lie in its organization and logical sequence of topics which are very well realized. The level is elementary and no particular mathematical sophistication is assumed, with nothing further than beginning calculus employed throughout.

The book does not discuss any of the more modern concepts involving the use of renormalization group approaches to the derivation of scaling laws for polymer solution and melt behavior. While many of these topics are too advanced for the text, some of them, such as the concept of reptation, could certainly be discussed on a level of difficulty no greater than that of the Rouse theory, which is included. Similar remarks also apply to the rubber elasticity discussion, which does not include the so-called "phantom network" concept that is a current topic of considerable debate.

The book should be suitable as an introductory text for physics and chemistry students who are senior undergraduates or perhaps first year graduate students. It fills a niche which was empty, as there is no other comparable work of which I am aware which collects all the topics treated here in a unified way. As such, it is deserving of wide use. Its utility as a text could have been improved, however, by the inclusion of problem sets at the end of each chapter. Nevertheless, the author is to be applauded for this imaginative approach which brings together a wide variety of phenomena in a coherent fashion.

W. J. MacKnight, *University of Massachusetts*

The Organic Chemistry of Iron. Volume 2. Edited by E. A. Koerner von Gustorf, F. W. Grevels, and I. Fischler. Academic Press, New York. 1981. $39.00.

The second volume of "The Organic Chemistry of Iron" (a sequel to the first volume published in 1978) contains four chapters in iron chemistry which deal with Iron-Olefin Complexes, Arene Complexes, Iron-Metal Bond Compounds, and Iron-Complexes with Sulfur Ligands.

The first chapter by R. C. Kerber deals with the chemistry of iron-olefin complexes in depth, and is very well organized. Unfortunately the review covers the literature only through 1976. The critical evaluation of the literature although not pronounced still is more apparent in this chapter than in the following chapters. Nevertheless, in 153 pages of text, Kerber is successful in presenting in a concise, well-organized manner an important area in the organic chemistry of iron.

The second chapter by R. B. King on the chemistry of the arene complexes of iron also does not cover the literature after 1976. It is an encyclopedic survey of iron-arene chemistry with emphasis on reactions rather than structure. It is a well-written, complete chapter.

The third chapter by the Late P. Chini deals with complexes that contain iron-metal (also iron-iron) bonds. This is also a very well organized chapter which attempts, and I believe succeeds, in putting some order in a very diverse area. All aspects of chemistry are considered, with particularly useful tables containing structural information.

The last chapter in the volume by L. Marko' and B. Marko'-Monostory deals with the chemistry of iron with sulfur containing ligands. The chapter is extensively referenced; however, the references often are not addressed individually. In search of a topic the reader is faced with a multitude of references all of which must be explored for content.

It seems that this volume is 3 or 4 years late in appearing, undoubtedly due to the untimely death of one of the editors, E. A. Koerner von Gustorf. Although not up-to-date, this book still should be very useful to the readers with interests in the chemistry of iron.

Dimitri Coucouvanis, *University of Michigan*

Optical and Laser Remote Sensing. Edited by D. K. Killenger and A. Mooradian. Springer-Verlag, Heidelberg and New York. 1983. x + 383 pp. $34.00.

This book appears to be the proceedings of an unidentified conference. It is a collection of reports of original research, some so abbreviated as to be little more than abstracts. They are reproduced from a distractingly wide variety of typescripts, and appear to have had no editorial control, or direction (the format of the bibliographies, for example, shows no consistency, and some papers do not even use reference numbers). The 42 papers are grouped into eight categories, such as LIDAR, UV-vis, and spectrometric techniques, atmospheric analysis, laser sources and detectors, etc. The editors and publishers apparently view the content as ephemeral, for they have not provided an index.

Dynamics of Gas-Surface Interaction. Springer Series in Chemical Physics. Volume 21. Edited by G. Benedek (Universita Milano) and U. Valbusa (Universita Genova). 1982. Springer-Verlag, Berlin. 1982. xi + 282 pp. $32.00.

This volume consists of several comprehensive and tutorially useful articles originating from lectures delivered at a course of the same name, held in Erice, July 1981. The emphasis in the book is on the use of molecular beams as a probe of surfaces, for both geometrical structural properties as revealed in the elastic diffraction and bound state resonance modes of operation as well as for surface excitations as seen in time-of-flight spectrometers recording inelastic atom scattering events. To the editors' credit, the contents of this book have been wisely picked in order to make it not only a very useful general point of entry into this growing field but also a good reference volume for those already involved. The topics covered are divided into four subcategories: scattering of atoms from solid surfaces, which deals with scattering theory and the scattering from semiconducting, metallic, and layered materials; a grouping of lectures on various aspects of adsorbed layers of interest to beamists; surface spectroscopies of mostly electronic excitations; and surface phonon spectroscopy by atom scattering. It is worthy of note that a basically successful attempt has been made to provide sufficient breadth of scope in this volume (course) to make it of interest to more than the spectrum of surface scientists traditionally associated with gas-surface interactions. The well-written articles by prominent contributors in the field make this a worthwhile addition to the rapidly growing shelf of surface related books.

J. William Gadzuk, *National Bureau of Standards*

Evolving Life Sciences Series. Volume 1 (Parts 1 and 2). Of Oxygen, Fuels and Living Matter. Edited by G. Semenza (ETH-Zentrum, Zürich). John Wiley & Sons, Ltd., New York. Part 1: 1981. xii + 349 pp. $73. Part 2: 1982. xii + 508 pp. $65.

These two books are unlike any others I have seen. They provide personal accounts by outstanding biochemists of their scientific careers and discoveries, accompanied by reproductions of some of their publications. The first chapter of Part 1 is by P. Mitchell and contains little biography compared to the extensive discussion of ligand conduction in chemical, osmotic, and chemiosmotic reaction mechanisms. It relates how the concept of proticity as the link between mitochondrial electron transfer and ATP synthesis was slowly accepted by his colleagues and—what has received less attention—how the phosphate group in cation-motive ATP-ases might be directly involved in the transport process. The second chapter is a biography of D. Keilin by E. F. Hartree and describes the fascinating story of the rediscovery of the cytochromes, first seen by C. A. MacMunn, now a century ago, and their organization into a respiratory chain (MacMunn's observations were challenged by Hoppe-Seyler and subsequently forgotten). This is followed by P. D. Boyer's account of his studies with ^{18}O and ^{31}P and his proposal of conformational coupling of proton gradients to phosphorylation. Chapter 4 has been written by E. F. Racker and his wife. Together (reconstitution?) they tell of his wide interests which vary from painting to glycolysis and oxidative phosphorylation. In the last chapter F. B. Straub, apart from describing his work on dehydrogenases and cytochrome oxidase and his collaboration with Szent-Gyorgi, gives a vivid account of what it was to be a biochemist before the second world war.

The same format is followed in Part 2 of Volume 1, which contains autobiographical accounts by C. Martius, B. L. Horecker, H. G. Wood, A. E. Braunstein, J. S. Fruton, E. L. Smith, and P. Karlson.

The Editor asked the contributors to describe the atmosphere in which they worked and which was conducive to their discoveries. Otherwise, they were left considerable freedom. As a result, the various accounts differ quite a bit, depending on the personal style of the author, but all succeed in giving lively view of enzymology in the days when this science was generally considered an exotic branch of colloid chemistry. There are a few criticisms. I would have appreciated a short historical introduction by the Editor on the organization of research at universities in the United States and the various countries of Europe in the twenties and thirties. The accounts could have been arranged chronologically. Lastly, some of the reproductions of original papers are poor.

Ordinary scientific works, such as textbooks and symposia proceedings, decrease in value with time, due to new developments. In contrast, the value of these two books can only increase. I believe that many scientists who, like myself, were not present when biochemistry became of age will enjoy these books. Highly recommended.

W. H. Koppenol, *University of Maryland Baltimore County*

Pattern Recognition in Chemistry. Lecture Notes in Chemistry. Volume 21. By Kurt Varmuza (Technische Universität Wien). Springer-Verlag, New York. 1980. v + 217 pp. $21.00.

Varmuza's book is written for the modern scientist who wishes to employ mathematics and computers for the understanding of chemical phenomena and associated large data sets. The author's philosophy is clearly expressed in the preface: "Application of computers in chemistry is a matter of utility, sometimes it is a social problem, but it is never a question of piety for the human brain". The book is then divided into three parts and thus so will the review. The first part, labeled A, presents a mathematical, conceptual, pictorial, and pedagogical description of pattern recognition. While the orientation and presentation of the material is inherently mathematical, the use of numerous diagrams and flowcharts provides organization and simplification and so aids readability for the non-expert. The next highly useful feature of this book is labeled part B, a collection of eight chapters, each of which deals with a major area of application of pattern recognition. Mostly dealing with analytical chemistry (e.g., Chapter 14 is devoted to chromatography), other chapters deal with other areas of chemical science (e.g., Chapter 16 includes a section of classification of materials in archaelogy). The book closes with part C, a lengthy appendix that gives an extensive bibliography on pattern recognition and an associated author and subject index. The book review now closes with a paraphrase of the initial quote—application of pattern recognition to chemistry is a matter of utility, and so is recommended.

Joel F. Liebman, *University of Maryland Baltimore County*

Advances in Physical Organic Chemistry. Volume 18. Edited by V. Gold (University of London, King's College) and D. Bethell (University of Liverpool). Academic Press Inc., London and New York. 1982. viii + 261 pp.

The latest volume in this series of monographs contains three chapters by established investigators who have fully maintained the high standard now expected of "Advances in Physical Organic Chemistry". J. Toullec, in writing on the Enolisation of Simple Carbonyl Compounds and Related Reactions, has provided a fresh and extensive review of what historically was termed as tautomerism. The adjective "simple" in this review refers to the fact that compounds which possess enol-stabilising functionalities (β-keto esters, etc.) are excluded from the present treatment. Studies of enolization have played a key role in the development of ideas of acid–base catalysis, and of kinetics in solution, as can be seen by tracing the line from Lapworth's (1904) discovery that enol formation is the rate-determining step in acid-catalyzed halogenation of ketones to the demonstration by Bartlett, Ingold, and others in the 1930's that rate-limiting enolization is also common to acid- and base-catalyzed isotopic (H/D) exchange and racemization. The author has amply shown, however, that the field remains in the forefront of current chemical thought. Thus some of the topics that are covered in depth are the following: kinetics and thermodynamics of keto–enol tautomerism, including applicability of the theory of proton transfer reactions; the Brönsted equation and deviations therefrom; development of the Marcus treatment; kinetic isotope effects and their structural and medium dependence; catalytic mechanisms, including bifunctional and metal-ion catalysis; characterization of simple enols (vinyl alcohol, etc.); enol ethers and enamines, including discussion of primary amine catalysis in various enzyme-catalyzed reactions.

The second chapter, by L. Eberson, is a timely and original account of Electron-Transfer Reactions in Organic Chemistry. As the author points out, it is a historical curiosity that the phenomenon of electron transfer forms such a small portion of current chemical dogma as represented by the majority of organic texts. In contrast, in inorganic chemistry, redox processes are recognized to play a vital role and have been interwoven at all levels of the subject for some time. It appears, therefore, that the accepted emphasis in organic chemistry on curved arrows denoting the movement of electrons *two-by-two* has developed almost to the exclusion of other possible reaction modes. This has resulted in the anomalous situation in which several schools of thought suggest that the majority of organic processes, of nucleophilic and electrophilic types overall, actually proceed by mechanisms involving single electron transfer. Nevertheless, current research in organic chemistry abounds with examples where *one-by-one* electron-transfer processes have been conclusively demonstrated to occur. The recognition that this is so is important, however, as in the case of the $S_{RN}1$ mechanism, for example, this has enabled the synthetic as well as mechanistic potential to be developed. The principal contribution of the present chapter is to provide an analysis in depth of the application of Marcus theory to a wide range of electron-transfer organic processes. In doing so, Eberson has undertaken to develop the necessary linguistic, conceptual, and formal changes which are required in going from an essentially inorganic theory to the organic equivalent. The article contains delightful statements, such as "Now the Marcus theory must tread lightly between the Scylla of adiabaticity and the Charybdis of non-adiabaticity!" Needless to say, this makes for sustained interest. Perhaps of greatest use to organic chemists will be the sections on synthetic classification of organic electron-transfer processes, and the examination of some postulated organic electron-transfer reactions, which include compilations of reactions that are known to proceed by electron-transfer mechanisms, those which could proceed in such a manner, and those where electron transfer is borderline or not feasible.

The final chapter, by G. B. Schuster and S. P. Schmidt, is concerned with Chemiluminescence of Organic Compounds, though it touches also on bioluminescence. Here is a lucid account of the theories and mechanisms whereby chemical reactions or living organisms emit light. It is somewhat comforting to the non-expert to be told that the answer to the question as to why any chemical reaction should generate electronically excited products when it could generate the same species in their ground state, remains largely unanswered. Nevertheless, the authors have set out clearly the requirements which must be met for a reaction to be chemiluminescent and have then described the essence of the major types of chemical systems which exhibit chemiluminescence. Some continuity with the chapter by Eberson exists, since one of the principal modes for the chemical generation of light is through electron transfer. Not surprisingly then, one of the theoretical treatments of chemiluminescent reactions is by Marcus, thus adding a further link to the other chapters in this volume. In conclusion, this volume should be useful to the non-specialist as well as the specialist and is an excellent addition to an established series.

E. Buncel, *Queen's University, Kingston*

Advances in Protein Chemistry. Volume 34. Edited by C. B. Anfinsen, John T. Edsall, and Frederic M. Richards. Academic Press, New York. 1981. 371 pp. $39.00.

"Advances in Protein Chemistry", due to its long tradition and primarily due to the good taste of its truly distinguished editors, is the best of the many Advances series with which I am familiar. Over its long history, this series has published some of the most influential and intellectual writing in its field. The editors were able to pick excellent authors to write reviews on rather broad topics of interest to many, and frequently to most, protein chemists. Over the last decade, the editors' problem became much harder as the field of protein chemistry fragmented. Most of the recent striking advances were concerned with rather narrow sets of proteins and not with all proteins in general. However, the editors of Volume 34 have selected four articles of rather broad interest and on the whole have succeeded rather well. Nonetheless, since I was in the fortunate position that among my colleagues there was a true expert on each of the four topics covered, I proceeded to enlist their help rather than to trust only my less-than-expert knowledge.

Michael Rossmann and I feel that the article by Jane S. Richardson, The Anatomy and Taxonomy of Protein Structure, is a clear highlight of the book. Not only does it occupy half of the pages, but these pages are filled with magnificent drawings and descriptions of X-ray crystallographic studies on numerous proteins. Look here for excellent summaries of secondary structural elements, for supersecondary structures, and for detailed classification of proteins on the basis of their three-dimensional structure.

Minou Bina and I feel that the review of The Histones by Ruth Sperling and Ellen J. Wachter, which focuses on nucleosomes and the dynamic structure of chromatin, achieves a great deal of enlightenment in very few pages. Albert Light and I feel that Donald B. Wetlaufer's article on Folding of Protein Fragments is a forceful statement and highly personal list of large amounts of rather convincing evidence in favor of protein folding via subassemblies. It is not, nor does it pretend to be, a complete review of protein folding. I feel that the article by Eddie Morild on The Theory of Pressure Effects on Enzymes is just the opposite of Wetlaufer's article—a very complete and careful but rather tedious and for me somewhat repetitious compilation of equations dealing with pressure effects on kinetics. Phillip Low disagrees even with this faint criticism.

It seems that 1981 (Volume 34) can be regarded as a good year.

Michael Laskowski, Jr., *Purdue University*

Gasdynamic Laser. By S. A. Losev (Moscow State University). Springer-Verlag, Berlin. 1981. x + 297 pp. $42.00.

The title "Gasdynamic Laser" is somewhat deceptive, since these lasers are really only discussed in the last 100 pages. The first 40 pages provide an excellent general discussion of lasers and quantum electronics, which would certainly be appropriate for beginning graduate students or for more advanced researchers in other fields. This is followed by equally lucid chapters on gas-phase kinetics and nozzle gas flow. In fact, this book would clearly be suitable as a textbook for a graduate-level special-topics course; the author strikes a good balance between mathematical rigor and broad coverage. The final chapters on gasdynamic lasers are naturally more detailed, and provide ample references to both English and translated Russian original works.

The most substantial flaws in the text come from inaccurate translations. For example, the concepts of "uniform" and "nonuniform" broadening presented in Chapter 2 are much more commonly called homogeneous and inhomogeneous broadening. This might prove confusing to an inexperienced reader. Other inconsistencies with common English usage appear in Chapters 3 and 4. However, I believe that these errors and the occasional incomplete sentences do not seriously reduce the book's utility, and I recommended it as a good advanced text for gas-phase laser spectroscopy and physical chemistry.

Warren S. Warren, *Princeton University*

Advances in Polymer Science. Volume 40. Luminescence. Edited by H.-J. Cantow (Universität Freiburg). Springer-Verlag, Berlin and New York. 1981. 167 pp. $42.90.

This volume comprises two review papers on luminescence; one deals with the investigation of polymers in solution by polarized luminescence, and the other deals with time-resolved fluorescence techniques in polymer and biopolymer studies.

Polarized fluorescence provides detailed information on micro-Brownian motion in polymer chains, which is related to various features of the structures and conformation properties of macromolecules. This review considers the use of covalently bonded luminescent markers, mainly anthracene derivatives, to study the intramacromolecular mobility of various polymers in solution, including their methods of preparation, results of specific examples, and theoretical aspects. Like other methods using probes as a means to study the molecular motion, this technique has not been so widely applied to the measurement of segmental motion in synthetic polymers.

The second review concerns the use of time-resolved behavior of fluorescence probe molecules in synthetic and biopolymers, and outlines the experimental methods available for the study of the decay characteristics of fluorescence on a nanosecond and subnanosecond scale. This time scale is one which coincides with that for various molecular motions in polymer systems. This again is the use of fluorescence decay characteristics as a probe. The main difficulties are the interpretation of experimental results.

Both these two methods have been available for a comparatively short time. The usefulness of the two reviews is to stimulate the interest of polymer chemists. However, the rapid development within recent years does not sound encouraging.

Tong-yin Yu, *Fudan University, Shanghai*

Plasma Science and Technology. By Herman V. Boenig. Cornell University Press, Ithaca, NY. 1982. 299 pp. $34.50.

The major emphasis of this book is on the application of electrical discharge plasmas (partly ionized gases and vapors which glow in an applied electrical field) for polymerization of hydrocarbons and deposition of films. Besides the mechanisms of plasma polymerization, the structure, properties, and applications of the polymers formed or treated in low-temperature plasmas are discussed. In the chapter on plasma deposition of films, the author analyzes the separate effects of a number of experimental parameters on the deposition processes. Such a listing is extremely useful for personnel working in the electronic industries in view of the importance of protective plasma coatings.

The book is not, however, without shortcomings. This reviewer could not find several references that are in the literature, particularly on the subject of glow-discharge chemistry. The author fails to mention that many syntheses of organics, particularly the cyclic compounds, may actually take place in a cold trap (77 K) downstream from the plasma rather than in the plasma, which merely fragments the starting material to produce the initial precursors of the products. In the low-power laboratory scale apparatus, the gas temperature is about 350 K, and the reactor must therefore often be heated to temperatures as high as 600–700 K to avoid polymerization on the walls. Practically none of the apparatus is devoid of a spatial afterglow at room temperature, which is probably the most active region in shaping the final precursors of the products. Therefore, several reactions that are labeled as plasma reactions are in fact only plasma-initiated and may occur elsewhere, depending on the plasma-chemical system.

Although the coverage of some topics in this book is rather sketchy (e.g., plasma etching, p 285), the book is a source of valuable information on polymers formed or treated in plasma. It is written at an introductory level and can easily be read by individuals who have basic scientific background. However, if the aim of the individual is to obtain some first-hand knowledge of plasma polymerization, the book might easily be overlooked because of an inappropriate title.

Mundiyath Venugopalan, *Western Illinois University*

Metal Interactions with Boron Clusters. Edited by Russell N. Grimes (University of Virginia). Plenum Press, New York. 1982. xiv + 327 pp. $42.50.

This is an important contribution to the expanding literature of molecular clusters; it focuses on the structural and bonding relationships between metals (main group and transition) and boron clusters. The following topics are covered: Structural and Bonding Features of Metallaboranes and Metallacarboranes (M. O'Neill and K. Wade), Transition-Metal Derivatives of Nido-Boranes and Some Related Species (N. Greenwood and J. Kennedy), Interactions of Metal Groups with the Octahydrotriborate(1−) Anion, $B_3H_8^-$ (D. Gaines and S. Hildebrandt), Metallaboron Cage Compounds of the Main Group Metals (L. Todd), closo-Carborane-Metal Complexes Containing Metal–Carbon and Metal–Boron σ-Bonds (S. Bresadola), Electrochemistry of Metallaboron Cage Compounds (W. Geiger), and Boron Clusters with Transition Metal–Hydrogen Bonds (R. Grimes).

Each of these chapters provides a detailed examination of the synthesis and structure of metallaboranes. Comprehensive analytical data (X-ray crystallography and NMR spectroscopy are two of the techniques widely described) are delineated to give the reader a feel for the methods used to characterize these species. In addition, the text is supported by an extensive list of references.

The first chapter of the book, which presents an outline of the structure and bonding of metallaboranes and metallacarboranes, deserves special attention because of the excellent manner in which the authors apply polyhedral borane bonding rules to other metal clusters. This chapter furnishes support for the view that boron chemistry has been strongly influential in the development of metal cluster chemistry.

The contributors to this book should be applauded for preparing a work which links boron with metal chemistry. I recommend "Metal Interactions with Boron Clusters" as a valuable reference for those chemists (boron and metal) who have research interests in this field.

Neil Canter, *University of Michigan*

Heilbron's Dictionary of Organic Compounds. Fifth Edition. Edited by J. Buckingham, S. M. Donaghy, and a team of Special Editors. Chapman and Hall, New York, London, and Toronto. 1982. 7848 pp. In 7 Volumes. $1950.00.

Sir Ian Heilbron's dictionary, first published in three volumes in 1934, rapidly earned an established place in the chemical household as a quick, convenient source of the essential information about the most important organic compounds. The originator, alas, has been dead for 24 years, but his name lives on in the work he established, even though it has been omitted from the title page.

This new edition is not a mere updating of the previous one, but embodies extensive change in detail, while maintaining the original concept. This time, a systematic study of user's needs and preferences was made before embarking on the actual work. As a result, the general organization and appearance have been continued; compounds are still entered in alphabetical order of the most familiar names, and the principle properties and key references are still given. However, the types of properties have been adjusted to reflect modern interests and techniques, and the references are now flagged with their principal content: synthesis, structure, isolation, spectra, etc. Both of these changes are great improvements, and vastly increase the usefulness of "Heilbron".

Furthermore, structural formulas have been redrafted, and are in general much clearer, and alternative names, nearly always included, are flagged with identification of their origin, if they happen to be those used in Chemical Abstracts Cumulative Indexes.

Still another change is the inclusion of multiple indexes: alternative name; formula; heteroatom; and CAS Registry Number. The combined indexes take up two of the seven volumes.

The value of a dictionary depends fundamentally on its reliability and completeness, and it is therefore appropriate to examine these qualities. Selection of 150 000 compounds out of the ca. five million reported ones is in itself a very difficult task, especially when one group of chemists may, for example, cry for hordes of natural products, whereas others may find their presence only an annoyance. No selection or set of criteria can please everyone, but the actual selection in the present case seems to be reasonably balanced. There are, of course, some curious, preseumably inadvertent omissions, such as penicillamine, and others that were presumably intentional, such as forskolin (which was in the fourth edition).

It is with respect to reliability that this edition falls short of reasonable expectations. Redrafting the structural formulas has resulted in numerous erroneous structures: ajugalactone, ponasterone C, crustecdysone, and antiarigenin are examples of rather gross errors (missing functional groups; wrong carbon skeleton). It is also strange that ponasterone C is listed under that name, whereas ponasterones A and B are only to be found under the systematic names of substituted cholestenone. Although it is commendable that in this edition the attempt is made to represent absolute configurations where they are known, they are not to be relied on; the aflatoxins, for example, are shown with wrong configurations. Since the foregoing errors were turned up by casual spot-checking, the disquieting thought arises that there are probably very many more indeed.

Even names are wrong in some instances, such as 1-phenylpropene, which is identified and alphabetized as 1-phenylpropane, and penicilloic acid, which is named and alphabetized as pencilloic acid. Molecular formulas are especially unreliable; the compiling staff seem to have had great difficulty in adding up the atoms accurately. One example out of many is 3,3-dichloro-2-phenylpropanoic acid, to which is assigned the erroneous formula $C_9H_8Cl_2O_4$. Such errors are propagated, indeed, expanded, in the formula index, with disastrous results. Only a casual perusal is required to turn up a handful of them, such as 8-nonenyl acetate, which is found listed under $C_{11}H_{15}O_3$, and *N*,*N*,2,4-tetramethylaniline, which is to be found under $C_{11}H_{17}N$, instead of under its proper formula, $C_{10}H_{15}N$. As a result, the user is advised to regard the formula index with the greatest suspicion, and to take nothing for granted.

References are also subject to error, such as the use of *Chem. Ber.* where *Chem. Lett.* is required.

The references are printed in the order year, volume, page, which is generally all right, but is confusing in the case of journals that do not have volume numbers. The confusion arises because the year and the page numbers are unfortunately set in the same type; use of italics for the year, a practice followed in many works, would have avoided this problem (i.e., *Tetrahedron Lett. 1976*, 1961). The structural formulas, which are displayed for most ring compounds, express stereochemistry clearly, by use of wedge-shaped and dashed bonds or Haworth projections. Cyclohexane rings are uniformly drawn planar; some chemists might have preferred to have them in conformational projection, but that is perhaps only a matter of taste. Substituents on rings, especially on benzene rings, are set right up against the apex of attachment, without an intervening bond. Although this practice does not generally result in ambiguity, it does lessen quick recognition, and in some readers' eyes is ugly. Furthermore, the practice is not applied consistently; among a number of examples may be cited 3,6-dichloro-2-hydroxycyclohexene, in which the chlorines are set off from the ring by bonds, but the hydroxyl group is squeezed directly up against the angle of the ring. Most books and journals consistently separate substituents from rings by means of bonds as a matter of policy.

The names chosen for the alphabetized entries are mostly very well chosen, and are found to be those that the organic chemist intuitively uses. They are largely user-oriented, and it is interesting to compare them with the indexer-oriented names found in Chemical Abstracts: e.g., "pentaphenylethane" (Heilbron) vs. "1,1′,1″,1‴-(1-ethanylidene-2-ylidyne)pentakisbenzene" (CA, 9th Cumulative Index). Could anything but a computer love the latter name? There are nevertheless some peculiarities in "Heilbron", such as the absence of "benzohydroxamic acid" as a main entry (it is cross-listed under benzoic acid with the unfortunate terminology "hydroxamate"), but it is to be found under "benzamide, *N*-hydroxy". Inconsistently, the naphthalene analogue is listed under "*N*-2-naphthoylhydroxylamine". Dimethylnitrosamine is easy to miss because it is not listed with alphabetical order of the substituents, but is found under "nitrosodimethylamine". "Malonic Acid" is not an entry; certainly that is a more familiar name than "propanedioic acid" under which it is listed. The next main entry after the latter name is another example of an egregious error; the entry is "propanedioic acid monomethyl ester", which is a circumlocution for the name monomethyl propanedioate. The alternative names (which do not include any based on "malonic acid"), the structure, and the data, however, all belong to monomethyl isopropylmalonate, a totally different compound. Cyclic imides, such as succinimide, are entered as heterocyclic compounds ("2,5-furandione" and "2,5-pyrrolidinedione", respectively); presumably different contributors had different subjective perceptions when settling on the most familiar names. Such a reason may explain why "propanoic acid" is entered thus, but its amide is to be found under "propionamide".

A valuable feature of this edition is the inclusion of alerting signals for potential hazards of flammability, explosiveness, and toxicity. The editors have prudently added a cautionary statement to the effect that the absence of such notice should never be taken to imply the absence of hazard; numerous obviously toxic or flammable substances are listed unflagged, simply because their hazardous properties have escaped documentation. (There are a few hazard alerts that seem more exotic than pertinent, such as that appended to methyl malonate: "reacts violently with methyl azide in presence of base".)

This is a valuable work of reference, and at less than 3¢ per page is very reasonably priced. However, owing to its excessive content of errors, librarians might well be advised to affix a label to it: "Hazard! Incautious use may be injurious to your knowledge".

Chromatographic Separation and Extraction with Foamed Plastics and Rubbers. Chromatographic Science Series. Volume 21. By G. J. Moody and J. D. R. Thomas (University of Wales Institute of Science and Technology). Marcel Dekker, Inc., New York and Basel. 1982. vi + 139 pp. $29.75.

Since polyurethanes are manufactured annually in multimillion kilogram quantities for a wide range of markets, the authors state that such availability warrants their exploitation for separation and concentration processes in chemistry. In this book the first chapter focuses on the nature and properties of polyurethanes, including the types of polyurethanes, the physical and chemical properties, and the health hazards related to polyurethane foams. An excellent description of the fundamental chemistry of polyurethane synthesis is presented.

The inorganic applications of polyurethane foams in aqueous media are discussed in Chapter Two. The extraction of precious metals tin and antimony on unloaded foams is reviewed in addition to the mechanism of interaction between aqueous inorganic species and unloaded polyurethane foams. Foams loaded with solvent extractants, chelates, ion exchangers, and other media for inorganic extractions are adequately treated in this chapter.

Chapter Three deals with the application of polyurethane foams for the concentration of organic compounds, with emphasis on pesticides, in the atmosphere and waters. The concentration of pesticides, herbicides, phthalate esters, alkylbenzene sulfonate, phenols, oils, and nicotine in dilute samples by foam is described. In chapter Four (the final chapter) the utilization of open-pore polyurethane foams as a medium in gas–solid, gas–liquid, and low-pressure liquid chromatographic separations is only briefly discussed.

The reading of this book is comfortable with only a few typographical errors. An index is provided along with 147 references, although only 15 of them are more current than 1980. Nevertheless, the authors have admirably covered the topic in a thorough yet concise fashion. The relatively modest price of this book should ensure its acquisition by personal, corporate, and institutional purchases.

Eugene F. Barry, *University of Lowell*

Chemical Derivatization in Analytical Chemistry. Volume 2. Separation and Continuous Flow Techniques. Edited by R. W. Frei (Free University) and J. F. Lawrence (Food Research Division of the Department of National Health and Welfare). Plenum Press, New York. 1982. xii + 298 pp. $39.50.

This is the second volume in a series edited by two distinguished scientists in the field. The volume continues the clarity with which the material was presented in the first volume. This reviewer found the book relatively easy to read, with much useful information and many references.

Chapter 1, on flow injection analysis, by Karlberg, provides a good overview of the present status of this important analytical technique. Particularly noteworthy is the detailed discussion on the development and performance of a basic FIA system. This methodology has been widely adopted in the field of analytical chemistry. Chapter 2, on ion pair reactions, by Schill and Westerlund, follows a format similar to previous review articles by this group. New material is interspersed with the more classical studies of ion pair extraction and derivatization in order to indicate the interesting application of well-known phenomena to relevant problems of analytical chemistry. Chapter 3, on immobilized enzymes as pre- and post-column reactors for LC, by Bowers and Bostick, is well developed and particularly well organized. Chromatographers would be advised to read this excellent chapter carefully as undoubtedly immobilized enzymes represent a powerful tool for derivatization, particularly when coupled to liq. chromatography. This reviewer also enjoyed Chapter 4, on resolution of optical isomers by GC and LC, by Lindner. Rather than being a listing of various applications, the chapter is organized with respect to the chemical principles involved in chiral recognition. This field has developed quite rapidly over the past few years and one can anticipate further advances. Someone unfamiliar with the broad subject would find this chapter quite useful, particularly with respect to the extensive reference list (177 citations). Chapter 5, on chemical derivatization in LC, by Lawrence, provides a useful summary of popular derivatizing agents in LC. The chapter is authoritative and will prove helpful to analytical chemists who need to solve real world problems. The final chapter, on the derivatization of food additives followed by chromatographic determination, by Page and Conacher, provides a number of applications. While the chapter will be of interest to those with problems in the analysis of food additives, one wonders why the article was not put in a different volume dealing with specific applications. The flavor of the rest of the text is on general principles and methodology on derivatization rather than specific subjects of application. Nevertheless, the chapter is easy to follow and well written.

In summary, Volume 2 continues the practical bent of the first volume. Most of the chapters are well organized and written quite clearly. The editors are to be congratulated in bringing together such a nice volume.

Barry L. Karger, *Northeastern University*

The Minicomputer in the Laboratory. Second Edition. By James W. Cooper (Bruker Instruments, Inc.). John Wiley & Sons, New York, NY. 1983. xviii + 381 pp. $29.00.

Although the title might imply that this work offers a general treatment of the use of minicomputers in the laboratory, the book is almost entirely devoted to the PDP-11 series of minicomputers. In fact, its best use would be as a handbook or student text for an introduction to the use of the PDP-11 in the laboratory. More than half of the text is specifically aimed at fundamental programming of the PDP-11, including a detailed description of the instrument set, the PDP-11 assembly language, and program debugging procedures. In the latter portion of the book, the author treats such general topics as signal averaging, plotting methods, and the use of Fourier transform techniques with spectral data. However, the laboratory application section does begin with a chapter devoted to a DEC laboratory data peripheral. A number of exercises have been included in most of the chapters, especially in the first part of the book. The highly specific nature of the book allows it to serve as a good introduction to the use of the PDP-11 in the laboratory, but prevents it from serving as a general introduction to the use of mini- or microcomputers in the laboratory.

Maurice I. Hart, *University of Scranton*

Cobalt and Its Alloys. By W. Betteridge (formerly with International Nickel Limited). Ellis Horword Limited, Chichester. 1982. 159 pp. $49.95.

This small reference book is a well-done classical summary of the science and technology of cobalt metal. It is concerned primarily with the metal state and includes only that chemistry which is important in the production of the metal. The text is easily readable with very convenient placement of figures and tables close to the text references. The major metallurgical uses of cobalt are discussed concisely but with sufficient explanation that the numerical data can be used with understanding rather than blind faith. This is an excellent reference book for anyone concerned with cobalt metal or with any of its major technological applications.

David T. Peterson, *Iowa State University*

Advances in Inorganic and Bioinorganic Mechanisms. Volume I. Edited by A. G. Sykes (The University, Newcastle upon Tyne). Academic Press, Inc., London. 1982. ix + 420 pp. $67.00.

An obvious gap is filled by the introduction of this series of reviews devoted to current topics in mechanistic inorganic and bioinorganic chemistry. The editor's intention is to confine topics to metal ions, including transition-metal complexes, organometallics, metalloproteins, and main-group metals. Experimental results, research techniques, and theoretical aspects of this subject matter are all to be included. Another intention is to increase the dialogue between researchers who are primarily in either the inorganic or bioinorganic area. This first volume sets an excellent standard for those that will follow.

Seven reviews are presented and each was found to be well written, authoritative, and amply referenced. A variety of subjects is discussed. Each of the topics mentioned by the editor in his preface is covered by at least one of these papers. One aspect of the reviews which seemed to vary greatly is the balance between the presentation of historical background and the presentation of the most recent results from the literature. For example, topics covered in the review of biological oxygen carriers also may be found in standard inorganic texts, whereas the review on reactions of elements in groups I–III contains six citations from the 1982 literature thoughtfully added in proof. Each paper does contain adequate historical background to make the review valuable to students or others just becoming familiar with the topic. This asset will be especially welcome by those who will use this volume in a lecture course. I would find this volume (and hopefully the ones that follow) to be an excellent reference text in a course on inorganic/bioinorganic mechanisms. This series will be most welcomed by anyone who has an interest in aspects of mechanistic inorganic chemistry.

James V. McArdle, *SmithKline Beckman Corporation*

Heavy Gas and Risk Assessment. Edited by S. Hartwig. D. Reidel Publishing Co., Dordrecht, Holland. 1980. vii + 306 pp. $37.00.

Proceedings of a Symposium on Heavy Gases held September 3–4, 1979 in Frankfurt/Main, West Germany, consisting of 15 papers (10 in English, 5 in German) of authors' typewritten, camera-ready manuscripts. The volume deals principally with mathematical models for the atmospheric dispersion of dense flammable or toxic vapors, since reliable empirical data are scarce.

Howard D. Mettee, *Youngstown State University*

Introduction to the Theory of Laser-Atom Interactions. By Marvin H. Mittleman (The City College of the City University of New York). Plenum Press, New York. 1982. xi + 198 pp. $35.00.

This book is an excellent treatise of the theory of key processes observed in recent experiments on laser-atom interactions. A set of fundamental concepts is systematically developed, both with respect to the properties of the radiation field and the atomic states as influenced by the field. These concepts are then applied to the description of phenomena such as fluorescence and ionization. The book to a certain extent can be regarded as a complement and sequel to an earlier book "Optical Resonances and Two-Level Atoms" by L. Allen and J. H. Eberly, Wiley-Interscience, New York, 1975. While that book is primarily concerned with what could be regarded as static phenomena in the sense that the motion of the atom plays at most a minor or perturbative role, the monograph by M. H. Mittleman presents theoretical techniques for a wide variety of dynamical processes, including the deflection of atoms by the radiation field, potential scattering of charged particles, electron–atom scattering, and atom–atom scattering, all in the field of a laser. Professor Mittleman himself has contributed greatly to these topics and hence is in an excellent position to give a unified picture of the latest and best theories as developed by him and others. These include the novel idea that laser radiation can actually interact directly with the dynamics of a collision process, without the requirement that the photon energy be resonant with asymptotic atomic states.

As pointed out in the Preface, the book is slightly longer than a size that could be covered in a one-semester course, hence allowing the instructor some options, and the level of presentation assumes the reader to have a knowledge of elementary quantum mechanics such as taught to advanced undergraduates or first-year graduate students. Since this is not a text on atomic physics per se, the material is not carried extensively beyond the point where the laser no longer plays a role. In conclusion, both experimentalists and theoreticians interested in laser-induced molecular physics will benefit from this book as a valuable source of the state-of-the-art techniques for describing laser–atom interactions and various resulting physical phenomena.

Thomas F. George, *University of Rochester*