Also contributing to the noted change in the electrochemical reversibility of IIc is the limited amount of electroactive material available which makes more noticeable any amount of oxidized intermediate which decomposes.

On the other hand, since pyrazole formation is a significantly more difficult process for the tricylic I derivatives,[4,5] even the surface-bonded Ic radical cation remains sufficiently stable to display a reversible $i-V$ curve. The N-phenylpyrazolines are known to be electrochemically irreversible where the radical cations dimerize via the phenyl para position.[9]

Acknowledgment. The author wishes to acknowledge R. Hernandez and M. Ochoa for technical assistance, K. K. Kanazawa and R. Galloway for providing the electrochemical instrumentation, and K. K. Kanazawa for many useful discussions.

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*Book Reviews**

Advances in Radiation Research in Biology and Medicine. Volumes I and II. Edited by J. F. DUPLAN and A. CHAPIRO. Gordon & Breach, New York, N.Y. 1974. Vol. I: xxiv + 465 pp. $36.00. Vol. II: ix + 530 pp. $42.00.

These volumes contain the papers presented at an international symposium held at Evian in 1970. Ultraviolet, γ, and neutron radiation are included. A large proportion of Vol. I is devoted to radiation biochemistry, with particular concern for effects on DNA; Vol. II is somewhat more biological in emphasis. The papers are mostly accounts of original research, although there is some review material. It is a pity that there is no index.

The Beilstein Guide. By O. WEISSBACK. Springer-Verlag, New York and Heidelberg. 1976. 95 pp. $4.90.

This soft-bound booklet describes with great precision and succinctness the organization of Beilstein's "Handbuch der Organischen Chemie", and the principles on which it is based. Proper attention to what is stated should allow a searcher to find a desired item of information efficiently, but attentiveness is essential, for the presentation is concentrated and in no way repetitive. The emphasis is primarily on what the organization is and somewhat less on how to use it. There are many helpful examples, however. Nearly half of the work is a German-English-French glossary, which includes a great majority of the terms used in Beilstein. It should enable the reader who knows little or no German to make effective use of Beilstein nevertheless.

Chromium: Its Physicochemical Behavior and Petrologic Significance. Edited by T. N. IRVINE. Pergamon Press, New York, N.Y. 1975. 296 pp. $30.00.

This book is offered as an issue of *Geochimica et Cosmochimica Acta* and contains 24 papers presented at the Carnegie Institution Conference held in January 1974. The papers are concerned with thermochemistry, crystallography, phase equilibria, etc., largely in a mineralogical context. They are partly review papers and partly reports of original research. There is no index.

Colloid and Interface Science. Volumes II–V. Edited by M. KERKER. Academic Press, New York, N.Y. 1976. Vol. II: xx + 481 pp. $21.00. Vol. III: xx + 548 pp. $22.50. Vol. IV: xviii + 587 pp. $22.00; Vol. V: xvi + 507 pp. $22.00.

These volumes contain the 221 contributed papers presented at the International Conference on Colloids and Surfaces, held in June 1976. Some are reviews, but most are accounts of original research. Many are given as abstracts only; in others, the description of experimental procedures varies from general indications to precise details. The papers have been reproduced from the authors' typescripts, in a variety of type faces, but the method of reproduction is superior to that usually encountered and makes an impression more like that of a typeset book.

Volume II contains the papers on "Aerosols, Emulsions, and Surfactants". Volume III is devoted to "Adsorption, Catalysis, Solid Surfaces, Wetting, Surface Tension, and Water". In Volume IV, we find papers on "Hydrosols and Rheology", and in Volume V, "Biocolloids, Polymers, Monolayers, Membranes and General Papers". There are no indexes.

Crystal Growth and Characterization. Edited by R. UEDA and J. B. MULLIN. American Elsevier, New York, and North-Holland Publishing Co., Amsterdam. 1975. vii + 419 pp. $33.95.

This book contains the proceedings of the Second International Spring School on Crystal Growth, held in Japan in 1974. There are 27 papers, reproduced from typescript that appears to have been photoreduced to about half size, and accompanied by abundant photographs, drawings, and graphs. The emphasis is on crystal growth from melts and on surface and structural properties. The subject matter is generally discussed from the standpoint of the materials scientist interested in semiconductors, optical materials, and other technological applications.

Encyclopedia of Antibiotics. By JOHN S. GLASBY. Wiley/Interscience, New York, N.Y. 1977. 372 pp. $42.50.

If one knows the name of an antibiotic, this book allows one to find out quickly its formula, structure if known, its source and isolation procedure, physical properties, and its biological and medicinal action, together with a few key references. The patent literature has been given due attention. The scope of the work is broad, since the author has followed the definition of Benedict and Langlyke for the term antibiotic: a substance derived from or produced by a living organism, capable of inhibiting microorganisms in low concentration. The book is well produced and convenient to use.

Mathematical Models of Metabolic Regulation. Edited by T. KELETI and S. LAKATOS. Akademia Kiadó, Budapest. 1976. 260 pp. $15.00.

This work is Volume 18 of Symposia Biologica Hungarica and contains the papers delivered at the FEBS Advanced Course No. 27,

* Unsigned book reviews are by the Book Reviews Editor.

held in 1974. There are five papers under the heading "Modelling of the kinetic and regulatory behavior of enzymes", four in the group "Modelling of metabolic pathways", and two headed "Modelling of cells and organisms". The contributors are largely from East Germany, with others from France, Hungary, USSR, Canada, and United States. There is a four-page subject index.

Pesticides in the Environment. Volume 2. Edited by R. H. WHITE-STEVENS. Marcel Dekker Inc., New York, N.Y. 1976. xvi + 458 pp. $37.50.

This volume is concerned primarily with the practical business of pest control, and therefore is essentially agricultural/horticultural in outlook rather than chemical. There are numerous pictures of plants and animals, but chemical formulas are largely confined to an interesting six-page table of agents for control of nematodes and appear not to have been proofread. The 58-page subject index is a joy, however, and enables one to look up the uses of a great variety of pesticides by either the chemical or trade name.

Rodd's Chemistry of Carbon Compounds. Second Edition. Volume IV. Part F. Elsevier Scientific Publishing Co., Amsterdam and New York. 1976. xx + 492 pp. $73.95.

Volume IV, "Heterocyclic Compounds", has now reached pyridines, quinolines, and isoquinolines with Part F. There are five chapters; three of them are as just noted, one is a unified treatment of their theoretical aspects and spectroscopy, and one is a minichapter of two and one-half pages about cycloalkenopyridines. This volume is of particular importance because of the predominance of the pyridine nucleus in naturally occurring substances, but there is also substantial theoretical interest deriving from comparison with the corresponding aromatic carboyclic compounds.

The four authors who undertook the unusually daunting task of confronting the avalanche of literature on the subject worked as a team, to achieve good integration of treatment. This seems to be a commendable procedure for adoption by many other works consisting of contributed chapters. They have managed to treat the subject in 438 pages of text, which is indeed a massive increase over the 180 pages devoted to the subject in the first edition. It is not stated how far up to date they carried their treatment, but the preface is dated July 1976, and many 1974 references can be found. It is good to see that many references to reviews and books are now given. The production is of a quality appropriate to the importance of the work. A thorough subject index makes this volume usable independently of the series.

Carbon Sulfides and Their Inorganic and Complex Chemistry. By G. GATTOW and W. BEHRENDT (Johannes Gutenberg University). (Volume 2 of "Topics in Sulfur Chemistry", edited by A. Senning). Georg Thieme Publishers, Stuttgart. 1977. 261 pp. DM 128.

The authors point out that there has been no comprehensive review of carbon disulfide outside of that by Kausch in 1929, in spite of the great importance of the compound and its long history (it was discovered in 1796). They have filled the lack very thoroughly indeed, and include 2107 references, stated to be a complete coverage up to the summer of 1975.

The book is divided into chapters on preparation and properties, on reactions, and on complexes of carbon disulfide, and one on related compounds having the S_2C skeleton. In the last group, compounds with bonding to another carbon (i.e., S_2C–C) are excluded; the chapter is essentially confined to dithioformic acid, dithiocarbamates, xanthates, thiocarbonates, and their relatives. The other sulfides of carbon, CS and C_3S_2, are the subjects of the final ten pages of text. There are altogether 74 tables, some of them several pages in length. The subject index is very detailed. This is the sort of book that will stand as the authoritative reference for a long time.

Organic Chemistry of Drug Syntheses. By DANIEL LEDNICER and LESTER A. MITSCHER. Wiley/Interscience, New York, N.Y. 1977. xvii + 471 pp. $22.50.

This book is a carefully organized survey of the methods used to synthesize a large variety of currently important medicinal agents, as reported in both journal and patent literature. The substances covered are those that have been assigned a generic name (which can be found in the index). There are 22 chapters, arranged by structural type, to suit the reader who is primarily a chemist. Each chapter begins with interesting and informative general remarks, which include useful descriptions of the medicinal properties, uses, and shortcomings of the substances to be discussed. Syntheses for even such simple drugs as sulfanilamide are shown, using easily followed equations and explanatory text. However, it is a great pity that yields, conditions, and catalysts are not given.

It is especially interesting to see in each chapter the relations of changes in structure to biological properties, and the range of properties associated with the main structural categories. Anyone teaching organic chemistry should find this book to be a most helpful source of supplementary material, and even experienced medicinal chemists should find it useful to have so much otherwise scattered information brought together.

The book ends with a cross index of drug names, a glossary of pharmaceutical terms (contributed by Philip F. von Voigtlander), and a subject index. It should become a well-used work of reference, for both personal and library use.

Residue Reviews. Volume 64. Edited by F. A. GUNTHER and J. D. GUNTHER. Springer-Verlag, New York, N.Y. 1976. viii + 142 pp. $16.80.

The first chapter is devoted to "collaborative studies" of methods of analysis for pesticide residues. This subject is defined as the utilization of the same description of a testing procedure by a number of independent laboratories, and obtaining compatible results, thereby establishing the reliability of the method for use in monitoring food quality in international commerce. Chapter 2 is also concerned with insecticides, in the aspect of their interaction with soil microbes.

The third chapter reviews benzoxazinones as natural products occurring in plants. They are of importance because of their possible influence on the effectiveness of herbicides, and on the resistance of plants to insects and disease. The last chapter discusses nitrosamines in food-stuffs, a subject of growing concern because of the carcinogenicity of some nitrosamines and the possibility of their formation from nitrites used as preservatives. As usual, the volume is well indexed.

Residue Reviews. Volume 65. Edited by F. A. GUNTHER and J. D. GUNTHER. Springer-Verlag, New York, N.Y. 1976. viii + 103 pp. $14.80.

This volume is a monograph on the effects of triazine herbicides on the physiology of plants, contributed by E. Ebert and S. W. Dumford. The scope ranges from biochemical to agricultural, with the most chemical aspect being a discussion of structure–activity relationships on inhibition of the photosynthetic process as determined by the Hill reaction.

Stereochemistry of Heterocyclic Compounds. Part 1. By W. L. F. ARMAREGO (The Australian National University). Wiley/Interscience, New York, N.Y. 1977. xvi + 433 pp. $39.95.

This book marks the beginning of a new series, "General Heterocyclic Chemistry", complementary to the well-known series "The Chemistry of Heterocyclic Compounds" under the general editorship of Taylor and Weissberger. Whereas the latter is organized according to classes of heterocycles, the new series is planned to deal with specific properties, types of behavior, reactions, etc., applied to the whole field of heterocyclic chemistry.

This volume is devoted to nitrogen heterocycles. It takes up stereochemistry in the broad sense and considers not only structure and conformation, but stereochemical syntheses and the stereochemical consequences of reactions. It is a comprehensive review, done critically but with restraint. There are abundant structural formulas, but no tables. The bibliographies are extensive; one chapter alone has 820 references. The subject index is satisfyingly detailed. Altogether, this is a most promising beginning for the new series.

Sulfur-Nitrogen Compounds. Part 1. Compounds with Sulfur of Oxidation Number VI. Volume 32 of the New Supplement Series of Gmelin's Handbuch der Anorganischen Chemie. Produced by the Gmelin-Institut fur Anorganische Chemie der Max-Planck Gesellschaft. Springer-Verlag, New York–Heidelberg–Berlin. 1977. 268 pp. $233.70.

It is a particular pleasure to see this subject brought up to date in the comprehensive manner characteristic of the Gmelin series. The chemistry of sulfur–nitrogen compounds has grown enormously since the appearance of Raschig's fascinating book "Schwefel- und Stickstoff Studien", and it was reviewed again in 1957 by Dr. Becke-

Goehring, who has played a major role in its development. Now she has supervised this volume, compiled by E. Fluck and W. Haubold, which covers the literature through 1975.

As usual in this series, all essential information on preparation, reactions, and properties are given, including spectrographic data. The text is in German, but the simple format should make it understandable to even those whose knowledge of the language is rudimentary, and there is a formula index and a ring index, but no name index, for the nomenclature of these extraordinary compounds has not yet been adequately developed along systematic lines.

"Gmelin", which went through a period of doldrums, has resumed publication of supplements at such a rate that one must marvel that it is possible. The series has quickly regained its position as the essential work of inorganic reference, parallel to "Beilstein" for organic compounds, and no serious chemical library should be without it.

Advances in Physical Organic Chemistry. Volume 12. Edited by V. GOLD (University of London) and D. BETHELL (University of Liverpool). Academic Press, New York, N.Y. 1976. viii + 318 pp. $27.25.

The two series of volumes, "Advances in Physical Organic Chemistry" and "Progress in Physical Organic Chemistry", have become extremely valuable, standard references. Topics in organic chemistry from the most basic through the relatively exotic have been reviewed in one or another of these volumes, and the chapters are almost without exception well written, authoritative, and organized so as to be easy to use. Volume 12 includes three chapters. The first, by L. Eberson and K. Nyberg (110 pp), is entitled, "Structure and Mechanism in Organic Electrochemistry". The authors concentrate mainly on mechanistic discussions and attempt to make this field understandable and accessible to organic chemists, to whom it certainly is largely unknown.

Chapter 2, by J. F. Ireland and P. A. H. Wyatt, is entitled "Acid-Base Properties of Electronically Excited States of Organic Molecules". This chapter (80 pp) presents mechanistic discussions and a series of lengthy tables that give pK values for a wide range of organic compounds both in ground and excited states. Although this topic is relatively familiar, this chapter is well organized and should prove very useful.

The third chapter, by P. Neta (77 pp), is titled "Application of Radiation Techniques to the Study of Organic Radicals". Chemists interested in free radical reactions often are unaware of the vast body of data from radiation studies, although this field has provided more absolute rate constants in the radical field than any other. Neta discusses, very briefly, the techniques used and some of the mechanistic questions which have been studied. He presents tables of absolute rate constants for reactions of a variety of organic substrates with the aquated electron, the hydrogen atom, the hydroxyl radical, and O^-. This field has been reviewed in numerous books and review chapters, but organic chemists may find this chapter particularly useful for their purposes.

William A. Pryor, *Louisiana State University*

Metal Ions in Biological Systems. Volume 6. Edited by HELMUT SIGEL (University of Basel, Switzerland). Marcel Dekker, Inc., New York, N.Y. 1976. xiii + 453 pp. $39.50.

This volume, which is subtitled "Biological Action of Metal Ions", consists of six chapters: Zinc and Its Role in Enzymes (140 pp, 385 references) by J. F. Chlebowski and J. E. Coleman; Vanadium in Selected Biological Systems (56 pp, 147 references) by W. R. Biggs and J. H. Swinehart; The Chemistry of Biological Nitrogen Fixation (53 pp, 286 references) by P. W. Schneider; The Metal Ion Acceleration of the Activation of Trypsinogen to Trypsin (40 pp, 87 references) by D. W. Darnall and E. R. Birnbaum; Metal Chelates in the Storage and Transport of Neurotransmitters (31 pp, 45 references) by K. S. Rajan, R. W. Colburn and J. M. Davis; and The Role of Divalent Metals in the Contraction of Muscle Fibers (76 pp, 347 references) by F. N. Briggs and R. J. Solaro. Also included is an author index and an extensive subject index. All but one of the articles are quite up to date and contain 1975, and occasionally 1976, literature references (the latest references are generally to the authors' own work). The chapter on nitrogen fixation cites literature through 1973.

The editor's statement of the purpose of this series is (in part) "... to help to break down the historically separate spheres of chemistry, biochemistry, biology, medicine and physics ...". If one considers only the affiliations of the authors of the six articles, the goal has very nearly been achieved in this volume alone. To some extent the background of the authors reflects the tenor of their articles and chemists may find some articles less satisfying than others. On the other hand, the chemistry of biological action is not as well defined for some metal ions as for others. Thus, the physiological effect of zinc and the chemical basis of its activity in a number of enzymes is well established. Chlebowski and Coleman have provided an excellent progress report on this area. Other chapters indicate that current knowledge of physiological action of certain metals (i.e., calcium effect on muscle contraction) is far more advanced than that of their chemical mechanisms.

This volume should be very useful to persons wishing to obtain background information and leading references to one of the areas surveyed. This is especially true for transition metal chemists who are looking for ways to justify their research to NIH.

E. Kent Barefield, *Georgia Institute of Technology*

New Synthetic Methods. Volumes 1 and 2. By E. V. DEHMLOW and 5 other contributors, M. SCHLOSSER and 6 other contributors, respectively. Verlag Chemie, Gmbh, Weinheim. 1975. Vol. 1: vii + 168 pp. DM 54. Vol. 2: vii + 172 pp. DM 54.

These volumes were prepared with the aim of describing certain areas of modern methods of synthetic organic chemistry such that their advantages, applications, and reaction conditions are presented, but not in detail.

The contents were selected from papers published in *Angewandte Chemie* which appeared to be of most interest to the readers. The topics covered in Volume 1 include phase transfer catalysis, carbon suboxide, halovinylene carbonates, cyclic peroxides, and organolithium in 1,3-anionic cycloadditions. Volume 2 includes controlled CC bond formation with organometallic reagents, metalated isocyanides, alkylation via metalated nitrosamines, halomalondialdehydes, and phosphorylcarbenes.

Walter E. Behnke, V. H. Maddox, *Parke, Davis & Company*

A Dictionary of Thermodynamics. By A. M. JAMES (Bedford College, University of London). Halsted Press, John Wiley & Sons, Inc., New York, N.Y. 1976. xii + 262 pp. $14.95.

This is not a dictionary in the sense of a glossary but is rather a collection of essays, varying in length from a sentence or two to several pages and arranged in alphabetical order according to subject, so as to constitute a review of chemical thermodynamics at about the level of junior-year physical chemistry. The discussions emphasize the significance and limitations of concepts, not derivations, and are generally clear and error-free. The few errors, none of which seems to be original, are probably more annoying to purists than to the students to whom the book is directed. (Examples: The terms "state function" and "total differential" are confused. The restriction that elements be in their most stable form belongs in the definition of standard quantity of formation, not standard state. Enthalpies and free energies cannot simultaneously be set to the corresponding quantities of formation except at absolute zero.) SI units are used throughout, and the treatment of symbols and units in the headings of tables and graphs is exemplary. The book concludes with tables of useful thermodynamic data.

This book, as the author intends, will be helpful to chemistry students reviewing chemical thermodynamics and to biologists and others who want a brief, introductory discussion of some particular topic.

Joseph P. Bevak, *Siena College, Loudonville, New York*

Handbook of Biochemistry and Molecular Biology. Third Edition. Volumes I, II, and III: Proteins. Edited by G. D. FASMAN (Brandeis University). CRC Press, Cleveland, Ohio. 1976. Vol. I: 427 pp. $49.95. Vol. II: 790 pp. $61.95. Vol. III: 633 pp. $56.95.

What should one want in a biochemical handbook? This reviewer has the following criteria, in order of decreasing importance: (a) a wealth of clearly organized, up-to-date, comparative tables; (b) complete literature citations for the tabulated data; (c) generally interesting and relevant subject matter—the information one would seek in a handbook; (d) a clear, logical structure in the ordering of the tables.

The three volumes devoted to amino acids, peptides, and proteins in the third edition of the "CRC Handbook of Biochemistry and

Molecular Biology" clearly satisfy the first two conditions. They seem lacking with respect to the last two, although it admittedly would be hard to cover everyone's desires concerning the third. In the Preface, the editor disclaims any intent to be encyclopedic and invites suggestions for added topics that should be included in future editions.

These volumes contain detailed and heavily referenced surveys of such topics as (a) the amino acid composition and/or sequence of hormones, viral coat proteins, enzymes, serum proteins, plant proteinase inhibitors, and various other protein subsets; (b) UV/visible, IR, Raman, and CD/ORD spectra of amino acids, peptides, and proteins; (c) the molecular weight and subunit composition of proteins; (d) metalloenzymes and metalloproteins; (e) inborn errors of amino acid and organic acid metabolism; (f) hemoglobin substitutions and deletions; and (g) synthetic polypeptides. Most of the information in these tables is available elsewhere; much of it obviously is lifted verbatim from standard reviews, perhaps with some updating. Many of the bibliographies contain no references more recent than 1974. However, the Handbook will prove valuable to people wanting rapid access to the research literature in the areas represented, provided absolute currency is not required.

Unfortunately, one must look elsewhere to find data on such topics as (a) what protein structures have been determined crystallographically; (b) the parameters and crystallographically determined occurrence of various kinds of protein secondary structure; (c) the dependence of various proteins on prosthetic groups and cofactors; (d) in vivo covalent modification of proteins such as phosphorylation, acetylation, and zymogen activation; (e) the occurrence of thiols and disulfides in proteins; (f) isoelectric points of proteins; (g) isozymes; or (h) allosteric properties of proteins. The editor has missed a chance to develop a unified and systematic summary of peptide and protein structure/formation, enforcing little cohesion or balance among the efforts of the various compilers.

The survey of metalloproteins would have been complemented nicely by a table of prosthetic-group occurrence. Sixteen pages describe biological transamidation, responsible for cross-linking structural proteins like collagen and fibrin, with the kind of detail that one would expect in a research paper. However, there is no review of zymogen activation, and barely a word appears about other, even more important, classes of post-translational protein modification in vivo. Many pages are devoted to complete amino acid sequences of various proteins, data which must be available readily in other standard sourees; the function of a handbook would have been served quite well by a bibliography of sequences. Primary structures are a perfect example of information that is essential to the specialist (who already knows the relevant literature) and of little value to the general reader.

There is no obvious unity or rationale behind the seven pages on the three-dimensional structures of proteins. They contain eight structures, some in stereo, some identifying residues, others simply tracing the backbone. That space could have contained instead a bibliography of known structures, giving the reader access to many times as much information. Ironically, the compiler of this material has authored an invaluable review of protein symmetry in a serial that many libraries do not carry. None of that information appears in this handbook. Hence, this important aspect of molecular architecture remains poorly accessible to the nonspecialist.

As a final indication of indifferent editing, it should be noted that about 80 pages on biochemical nomenclature are exactly duplicated in Volumes I and II. Such redundancy might be defended on the grounds that different classes of biochemists will purchase Volume I (which focuses on amino acids and peptides) and Volume II (which surveys various special topics in protein chemistry). However, most research groups and all libraries will want to obtain all three volumes. Given the wealth of topics of contemporary interest that find no place in this edition, 80 pages of duplication represent not only nine dollars of superfluous expense for the purchaser, but much more in lost opportunity to create a generally useful reference work.

Will **Bloch**, *Reed College*

Topics in Current Chemistry: Cosmochemistry. Edited by F. BOSCHKE, Springer-Verlag Publishers, New York, N.Y. 1974. 176 pp. $18.50.

Many exciting discoveries have recently been made about the chemistry of the moon and interstellar gas. Perhaps the most fascinating is the discovery of an amazing array of molecules in the interstellar gas including such species as formaldehyde, dimethyl ether, cyanodiacetylene, and ethanol. This volume discusses these and other topics in four sections: Interstellar Molecules, Carbon Chemistry of the Apollo Lunar Samples, Chemistry of the Moon, and Inorganic Geochemistry.

I. Section I on the interstellar gas is quite complete, touching almost all areas of general background, physical parameters (densities, temperatures), radiative transfer through a gaseous medium, laboratory measurements, and possible chemical formation schemes. Many of the discussions tend toward oversimplification, but this is compensated for by the range of topics covered. Overall, this section should be very informative to the interested scientist not working in the area, and also a good review for those engaged in this area of research. It is unfortunate that more current information is not included, but this is one price of an exciting rapidly moving area of research.

II. Although the news media adequately emphasized the lack of organic matter on the moon, the discussion of substances searched for, methods used, and results described in this section are extremely informative. As discussed, an understanding of the techniques used and results for the moon will be useful in interpreting data from other planets in the solar system.

III. The section on chemistry of the moon is an excellent informative discussion of the composition and history of the lunar surface as understood at the time of writing. The probable origin is discussed, as well as such topics as differentiation and layered structure of the mare.

IV. The section on inorganic geochemistry is not exactly an engaging discussion on the topic. The discussion presented left me wondering what I had read, even after a second reading. Perhaps this judgment is too harsh and this material would appear differently to those with different backgrounds.

On the whole, except for the last section, this set of reviews is engagingly written, informative, and relatively complete. I enthusiastically recommended it as a review for interested researchers as well as a source of information for classroom lectures. The section on interstellar molecules is particularly complete and provides a basis for understanding current developments in the field.

Frank O. Clark, *University of Kentucky*

Electron Spin Double Resonance Spectroscopy. By LARRY KEVAN (Wayne State University) and LOWELL D. KISPERT (University of Alabama). John Wiley & Sons, Inc., New York, N.Y. 1976. vii + 425 pp. $24.95.

As the need for improved resolution in ESR spectroscopy becomes more urgent, the techniques of double resonance spectroscopy (ELDOR and ENDOR) have found widespread applicability. This volume is a necessity for those who wish an introduction to this field as well as those with some experience. There are chapters on ESR and Double Resonance, Experimental Methods, Liquid Phase ENDOR, ENDOR in Solids, Liquid Phase ELDOR, Single Crystal and Powder ELDOR, and Biological Applications.

Each topic is well covered with sufficient diagrams and graphs to illustrate the concepts discussed in the text. The mathematical coverage is rigorous but not overbearing.

ELDOR and ENDOR are invaluable techniques used in examining biological systems; the chapter on this subject is very informative and discusses a topic that will be of increasing importance in the future.

The book is well written and the ideas discussed are easy to follow. There is an adequate reference list at the end of each chapter and very complete author and subject indexes.

Anyone who is interested in ESR spectroscopy should have this volume on his/her bookshelf. The nominal cost makes it accessible to all chemists.

Howard S. Friedman, *University of Michigan*

Metal Carbonyl Spectra. By P. S. BRATERMAN (University of Glasgow). Academic Press, New York, N.Y. 1975. v + 286 pp. $22.25.

The title of this book is somewhat misleading in that 93% of its contents is devoted solely to vibrational spectroscopy. Anyone interested in other forms of metal carbonyl spectra will be greatly disappointed in that only 16 pages at the very end are given to a discussion of photoelectron spectra, electronic absorption spectra, and ^{13}C NMR spectra of metal carbonyls. No mention is made of mass spectroscopy. A better title would have been Metal Carbonyl Vibrational Spectra.

The aim of the author was to write a book that would be useful for chemists who work with metal carbonyl complexes and who would like to use vibrational spectroscopy to its fullest advantage but who do not consider themselves spectroscopists. This aim has been well met. The basic principles of vibrational spectroscopy are fully discussed in the first chapter, and this is followed by a detailed theoretical treatment of the vibrational patterns expected for carbonyl complexes of various geometries and degrees of substitution. Then come two excellent chapters on experimental methods and spectra interpretation. These draw heavily on the author's own personal experience and are well illustrated with numerous spectra. Although the author does not attempt to fully survey the massive carbonyl literature, he does discuss in detail the common mononuclear (e.g., $M(CO)_6$) and dinuclear (e.g., $M_2(CO)_{10}$) carbonyls and tabulates data for over 700 complexes which range from monocarbonyls to polynuclear carbonyl clusters.

This is an excellent book for the practicing metal carbonyl chemist who would like to maximize the structural knowledge that can be gained from vibrational spectroscopy, and it is highly recommended to workers in the field.

Gregory L. Geoffroy, *Pennsylvania State University*

Annual Reports on NMR Spectroscopy. Volume 6A. Edited by E. F. MOONEY (Anacon Limited). Academic Press, New York, N.Y. 1975. x + 457 pp. $40.00.

This volume includes the following articles: "Nuclear Magnetic Resonance Spectroscopy of Paramagnetic Species", "General Review of Nuclear Magnetic Resonance", "Nuclear Magnetic Resonance of Alkaloids", and "Two-bond Coupling Between Protons and Carbon-13". The book contains a subject, but no author, index.

This review stems from the premise that the book will have primarily an archival use. When the contents were written (1975), the reviews were reasonably up to date; i.e., they contain reports of primary literature of 1973–1974. At the time it was received for review (winter, 1977) the various articles were badly out of date. Assuming its arrival at institutional libraries at about the same time, its value must be to those interested in what was happening in the various fields 4 years ago. There is some evidence of wasteful duplication. For example, Figure 18 and some of the discussion in the article on paramagnetic species are duplicated as Figure 1 and discussion in the general review of NMR. In addition, it is hard to see the reason for the editor, in the latter article, allowing coverage of T_1 and T_2 measurements on ^{13}C in 6 pages and the nuclear Overhauser effect in 0.5 page. Why even try? The review on the proton NMR of alkaloids could be useful to workers in that area although the author mentions ^{13}C work in only a short paragraph and in such a manner as to make the reader worry about the validity of many proton assignments. The review on ^{13}C–^{1}H spin–spin coupling is well written and tabulated but data collection appear to have finished as of 1972.

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Introduction to Organic Chemistry. By ANDREW STREITWIESER, JR., and CLAYTON H. HEATHCOCK (University of California, Berkeley). Macmillan Publishing Co., New York, N.Y. 1976. xvi + 1279 pp. $19.95.

This is one of several new textbooks that is intended for use in the sophomore-level organic chemistry course. It should appeal to both the student majoring in chemistry and to the student majoring in the biological sciences. The text is organized into 37 chapters primarily on the basis of functional group chemistry, an organization that has proven to be very successful.

Besides the expected coverage of functional group chemistry, a separate chapter is used to introduce each of the main spectroscopic techniques: NMR spectroscopy, IR spectroscopy, mass spectroscopy, and UV spectroscopy. Chapters 2 and 3 contain an excellent introduction to the principles of structure and bonding, reaction kinetics and thermodynamics, and reaction mechanisms. Other topical chapters provide special coverage of sterioisomerism, organic synthesis, and the chemical literature. Subject matter related to biochemistry is generally integrated into the chapters on functional group chemistry, but one chapter is devoted to carbohydrate chemistry and a second chapter gives special emphasis to the chemistry of amino acids, peptides, and proteins. A single "Special Topics" chapter briefly covers aromaticity, pericyclic transition states, nucleic acids, organic coloring matters, photochemistry, biosynthesis, and stereospecific synthesis. Overall, the coverage of topics is excellent and few instructors who use this text will find that supplemental material is necessary. One aspect of the organization of topics that may concern some is the belated introduction of aromatic chemistry. Benzene is not discussed until Chapter 21, and aromatic substitution reactions are not covered in depth until Chapter 29. However, this does not appear to be a serious pedagogical problem except with the parallel sequencing of experiments in the laboratory.

An excellent presentation of acid–base chemistry provides the foundation for the rational discussion of many reaction mechanism and reactivity trends. The use of resonance structures rather than molecular orbital theory is emphasized. After the introductory chapters, spectroscopy is integrated into many of the following chapters. Examples of reactions are numerous and well chosen. The yield and reaction conditions are given for many of these examples. This information and the practical notes on reagents and techniques clearly emphasize that organic chemistry is an experimental science. A summary of functional group preparations is included in an appendix.

An ample number of problems are included at the end of each chapter, but no problems were placed within the chapter at the conclusion of a section or topic. An answer book is available as a supplement to the text. Drawings and chemical structures are sharp and uncluttered. Some stereo drawings have been included, but a simple stereo viewer, which is necessary for the stereo effect, was not provided.

Overall this text is well designed and clearly written. Editing and proofreading have been done with care. The material presented should challenge the best students but still not frustrate the average student. Any instructor who is looking for a new sophomore-level organic chemistry text that is complete and up to date in its coverage should seriously consider this text for adoption.

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Rare Gas Solids. Volume 1. Edited by M. D. KLEIN (National Research Council, Canada) and J. A. VENABLES (University of Sussex, England). Academic Press, New York, N.Y. 1976. xiii + 607 pp. $46.75.

Among the common books on noble gases, none deals to any extent with a description of condensed systems. The book by Klein and Venables serves a useful purpose by describing this very important and timely subject. The first chapter by Horton is a historical description of the subject. This lively written chapter is as interesting as the book by William Ramsey of 1898 on the same subject. The second and third chapters by Bell and Zucker, and Murrel are complementary and contain information on long-range and short- and intermediate range forces. Chapter Four by Barker on interatomic potentials is a theoretical account of experimental data. Chapters Five and Six by Werthamer, and Klein and Koehler relate to phonon theory and lattice dynamics. Chapter Seven is devoted to helium. This is justified on the basis of special properties of helium and relevant available information. The final chapters deal with band structure and excitons by Roessler and crystal structures by Niebel and Venables.

For a book written by many authors the book contains little unnecessary overlapping information. Any duplication of the information is justified by the objective of the editors to make each chapter independent. This objective is largely met without too much damage to the flow of the information through the various chapters.

The mathematical requirements of the book are reasonable. This will undoubtedly increase the usefulness of the book and enlarge the reader audience beyond the specialists.

The only major inadequacy relates to the title of the book. A gas such as argon which constitutes 1% of the air can hardly be termed rare. On the other hand, many rare but non-noble gases are not included in the book. A similar argumentation can be made for the word *solids*. The book deals with condensed noble gases and should have been titled accordingly.

This reviewer has read the book by Klein and Venables with a great deal of pleasure and is looking forward to reading the second volume. The enthusiasm of certain authors of the book is clearly evident and the reader feels the interest of the authors. It is well prepared, comprehensive, and reasonably up to date. Investigators involved in the study of noble gases will find this book very useful.

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