

Book Reviews

Recent Developments in the Chemistry of Natural Carbon Compounds. Volume 6. Edited by R. BOGNAR, V. BRUCKNER, and CS. SZANTAY. Akademiai Kiado (Publishing House of the Hungarian Academy of Sciences), Budapest. 1975. 198 pp. \$12.00.

This represents a new addition to a continuing series which, judging from literature citations, appears not to receive the use that it deserves. Organic chemists, in particular those interested in natural products, should familiarize themselves with the variety of topics which are covered.

The present volume consists of three chapters: Approaches to Camptothecin (E. Winterfeldt), The Pyrrolizidine Alkaloids (A. Klasek and O. Weinbergova), and Advances in the Chemistry of Glycosaminides (A. Ya. Khorlin and S. E. Zurabyan). The first chapter represents one of three available reviews describing synthetic work on the antitumor alkaloid camptothecin which cover the literature to early 1973. The author's somewhat caustic prediction that "during the time required for the publication of this paper further important results will be reported" has been verified: four new syntheses of camptothecin have been reported. A format of synthetic schemes allowing easy visual retrieval of information similar to recent practice adopted in compilations of organic syntheses would have been appreciated. Nevertheless, this chapter offers detailed insight into the synthetic work, some of which was cleverly executed in the author's laboratory.

The second chapter deals with a class of alkaloids whose pharmacological effects have been recognized since ancient times. In spite of the availability of other reviews and books covering the literature to the late 1960's, this is a complete review dealing with the structural elucidation, synthesis, biosynthesis, and biological effects. Tables of detailed data on all known pyrrolizidine alkaloids are provided. Specialist alkaloid chemists will find this chapter useful; chemists with an eye for increasing the efficiency of syntheses may wish to browse.

The final chapter is a comprehensive account of work up to 1973 concerning the synthesis of glycosaminides, a class of amino sugars which are important components of polysaccharides and other complex biopolymers. Tables of compounds synthesized and their physical data are given. The current state of the art is that although methods for trans glycosamidic bond formation are abundantly available, the synthesis of amino sugar-containing polysaccharides is at an early stage of development. This chapter should offer stimulation toward accomplishing the more complex goals.

Owing to the poor binding, the book will not survive constant use. However, there is an inserted slip which guarantees exchange. Moreover, a Fieser and Fieser it is not, and at the quoted price it is a good bargain even though interest may not extend beyond one of the chapters.

Victor Snieckus, *University of Waterloo*

The Origin of Life and Evolutionary Biochemistry. Edited by K. DOSE, S. W. FOX, G. A. DEBORIN, and T. E. PAVLOVSKAYA. Plenum Press, New York, N.Y. 1974. 476 pp. \$35.00.

This monograph commemorates the 50th anniversary of "Proiskhozdenie Zhizni", and the eightieth birthday of A. I. Oparin, the author of that important and original publication. A short historical introduction relating to the central part played by Oparin in the development of studies on the origin of life is followed by 41 contributions from 60 authors. With one or two notable exceptions, nearly all of the well-recognized workers in the field have made contributions to this volume: a tribute both to Oparin and to the standing of the editors. The result is that in a single publication of 470 pages the reader is exposed to a remarkable number of the strengths and the weaknesses of this rapidly growing field of enquiry. Some of the contributions carefully document incisive scientific experiments, unpublished elsewhere. Also there are anecdotal reports of recent results, unaccompanied by sufficient experimental detail for the reader to evaluate the reliability of the work. Some authors may have been caught with no new results to communicate, but a strong desire to join with the

others in this commemorative volume. There is much stimulating theoretical and philosophical discussion, but again, an author may instead hide his ideas behind a hedge of semiscientific terms. The papers—all in English though coming from eleven countries—range from 2 to about 23 pages in length, and are all reproduced from typescript (two type faces were used, but it is hard to tell them apart). No attempt has been made to arrange the papers according to subject matter: they appear in alphabetical order of the first authors. There is a list of contributions at the front, and an alphabetical list of contributors and addresses at the back, but there is no general subject index and there are no abstracts. Each paper is followed by its own bibliography, and the citations are appropriately up to date.

The general feeling of this reviewer is that the book resembles the field itself to a quite remarkable degree: the ideas vary widely in their impact, as does the clarity of their exposition, but there is often that tension present that seems to accompany a field in which a major new discovery may break out at any moment. It is not a general introductory text, though the expert probably will buy the book for its detailed content. The beginner may yet buy it for its flavor!

D. A. Usher, *Cornell University*

Advances in Chemical Physics. Volumes 31 and 32. Edited by I. PRIGOGINE (University of Brussels & University of Texas) and S. A. RICE (The University of Chicago). John Wiley & Sons, New York, N.Y. 1975. Vol. 31: ix + 496 pp. \$34.95. Vol. 32: x + 496 pp. \$27.50.

As stated by I. Prigogine in the Introduction of the book, the intent of this science series is to permit "... an expert to write a comprehensive article in which he explains his view on a subject freely and without limitation of space" (page v). Such an approach for a series is necessitated by the brevity of scientific articles whose lack of detail makes it difficult for anyone to follow unless he is an expert in that specific field. This reviewer agrees very strongly with the premise of the series and notes that the editors appear to have followed their own advice of *not* dictating the length of the article to the various contributors. Seven articles from ten contributors appear in Volume 31; the length of the contributions range from as few as 16 pages to as many as 136 pages. Thus, such contributions share many valuable points in common with comprehensive review articles which critically survey a field.

However, an added advantage to this type of series is that a number of articles written by a variety of authors can be grouped around a somewhat broadened theme encompassing several subfields, or around a principle which has application to several disciplines. Thus, such a series has the advantage of thoroughly covering a field or a principle from the viewpoints of several experts who are also free to speculate as well as give a critical analysis. For example, Volume 31 focuses on "Non-Simple Liquids" permitting ten contributors to comment on such diverse subjects within this area as: "Theory and Molecular Models for Water", "The Structure of Polar Fluids", "The Kinetic Theory of Dense Polyatomic Fluids", "Theory of Liquid Crystals", "Theory of Electron States in Liquid Metals", "Low-Energy Electrons in Non-polar Fluids", and "Solutions of Metal in Molten Salts".

This book may serve as a stimulator for new research within the area of nonsimple liquids. It may also be useful for professors in this research area to use as an instructional device to introduce graduate students into the subject via research seminars, or even perhaps as a resource book for very specialized graduate courses. However, several of the contributors have fallen into the trap that plagues most research scientists. In some of the articles, an insufficient introduction is given to introduce "nonexperts" such as this reviewer into the subject area. It would appear that it would be rather difficult for a novice to the field of nonsimple liquids to glean material from the book to use in more generalized chemistry, physics, or chemical physics courses.

Volume 32 of this series is devoted to the "Proceedings of the Conference on Instability and Dissipative Structure in Hydrodynamics" held in Brussels, Belgium, in 1973. Since it is the report of a conference, Volume 32 has more contributions (18) and contributors

(23) than some earlier volumes of this series. Correspondingly, the lengths of the articles are generally shorter, varying from a low of 3 pages to a high of 52 pages. While the conference reports (articles) may be more specialized than articles in earlier volumes of this series, Volume 32 as a whole covers a wide variety of subjects dealing with the theme of instability or dissipative structure. For example, the following topics are covered: mechanisms of instabilities in nonlinear systems; unified thermodynamic approach to instabilities; hydrodynamic stability theory; variational methods, local potential, and finite element methods with application to continuum mechanics; Glansdorff-Prigogine criterion and statistical theory; numerical methods for convection; effect of Prandtl number on finite amplitude; light scattering from nonequilibrium fluid systems; magnetic fields and convection; supercritical Benard convection and Taylor vortex flow; double-diffusive instabilities; cylindrical couette flow instabilities in nematic liquid crystals; water-ice mobile solidification interface; stellar evolutionary stability-spectral theory; stellar atmospheres-nonequilibrium thermodynamics; Benard instability in liquid mixtures; oscillatory convection in two-component fluids; and finite amplitude instability in two-component Benard problems.

The book undoubtedly will be of value to workers in the field and may generate new research work. However, it has been nearly three years since the conference occurred. It does give a wide variety of areas in which the concept of instability and dissipative structure can be applied, and could be useful to professors who wish to use it as a means of introducing graduate students to the concept. Although it appears to be better than earlier volumes of this series, it is not the type of book that complete novices to the field would use for an introduction.

Terry D. Alger

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Perfumes, Cosmetics & Soaps. Volume 1. The Raw Materials of Perfumery. Seventh Edition. By W. A. POUCHER. Revised by G. M. HOWARD. Wiley/Halsted, New York, N.Y. 1974. ix + 381 pp. \$24.00.

This volume is an alphabetical compilation of ingredients used in perfumery. Since the last edition appeared (1959), there has been a vast expansion of knowledge regarding the composition of natural flavors and fragrances, brought about by the application of sophisticated methods of separation (such as VPC) coupled with sensitive microanalytical procedures (e.g., MS, NMR). As only one example, during the 1960's the number of identified constituents of coffee aroma was extended from about 30 to over 200. In addition, the importance of several classes of compounds, such as thiazoles and pyrazines, in aroma chemistry was recognized for the first time.

Unfortunately, the work under review mirrors with only minor revisions the state of the art in the 1930's, when the principal author was most active professionally. Much space is devoted to the classical natural materials of perfumery (olibanum, civet, etc.), and the synthetics discussed are largely the readily accessible organics of that era. Cited preparations (such as acetone from pyrolysis of calcium acetate) are often woefully dated. Additionally, the work has lost some of its charm and utility through deletion of almost all the references and illustrations of the previous edition. Like it or not, today's perfumer is forced to be more and more a chemist and will receive scant help from this volume. There seems little incentive for its purchase by anyone already possessing an earlier edition, and it should be considered by others only for the historical background it provides.

Keith T. Buck

Frankincense Company, Detroit, Michigan

Perfumes, Cosmetics & Soaps. Volume 2. The Production, Manufacture and Application of Perfumes. Eighth Edition. By W. A. POUCHER. Wiley/Halsted, New York, N.Y. 1974. viii + 379 pp. \$24.00

The reprinting of this volume is justified both for its value as an introduction to the practice of perfumery and for the many formulations given which the modern practitioner may employ as starting points in fragrance development. The author's classic ordering of primary ingredients by volatility (Chapter 4) is particularly noteworthy.

Some attempt has been made to update the information since the last edition, although deficiencies in this respect are readily apparent. For example, formulations employing safrole and coumarin are given with no indication of possible health hazard, although use of these materials in foods was discontinued some time ago in the United

States. Today's perfumer will undoubtedly want to utilize some of the over 300 flavoring ingredients which have appeared on the GRAS list since 1970 but are not discussed in this work. The substitution of synthetics for many of the natural materials is also indicated by economics, due to skyrocketing world agricultural prices.

Almost half of the book is devoted to various flower perfumes. Other subjects include the production of natural perfumes and the use of fragrances in toilet waters, soaps, tobacco, incense, and sachets, as well as artificial fruit flavors.

Keith T. Buck

Frankincense Company, Detroit, Michigan

The Use of Fragrance in Consumer Products. By J. S. JELLINEK (Dragoco GmbH). Wiley-Interscience, New York, N.Y. 1975. xii + 219 pp. \$15.95.

Dr. Jellinek draws on twenty years' experience in all phases of the fragrance industry to distill the information contained in this book. The work is unique in being aimed at executives who are themselves not trained perfumers but who must make marketing decisions based on consumer acceptance of the fragrances of their products.

The style is direct, snappy, and pervaded with gentle humor. Fragrance is viewed as one of the several qualities of a finished product, which may play a direct role in consumer acceptance, as in deodorants, or exert an indirect, often sub-awareness influence, as in the detergent industry. As the author puts it, "fragrances communicate". Chapters are devoted to the role of fragrance, fragrance selection (both marketing and technical considerations), relations with fragrance suppliers, monitoring fragrance quality, organizational aspects of fragrance decisions, and some properties of fragrance. Sample questionnaires and examples of calculations for ranking odor preferences are given in the text. This book should provide fodder for many productive discussions in those numerous industries which use fragrances in their products.

Keith T. Buck

Frankincense Company, Detroit, Michigan

Polymer Engineering. By H. LEVERNE WILLIAMS (University of Toronto). Elsevier Scientific Publishing Co., New York and Amsterdam. 1975. x + 166 pp. 35.00 Dfl (~\$14.75).

The book, "Polymer Engineering", is written in a comparatively simple and easily read style. It is at a level that should be understandable to engineering or chemistry senior undergraduates. The text touches on most aspects of polymer science ranging from polymerization through structure and properties to degradation. The most notable exception to this coverage is the lack of any discussion of polymer processing, which this reviewer finds somewhat surprising in a text on polymer engineering. The text is not intended as a reference book with a quantitative listing of physical, chemical, or mechanical properties. It is composed rather of a descriptive narrative of the nature of polymers and their properties.

As might be expected in such a brief survey, many of the descriptions are rather superficial and over simplified, and some of the theory or models presented are rather dated and no longer widely accepted (e.g., the descriptions of the crystalline state).

Nevertheless, it is the opinion of this reviewer that a study of this text would form a valuable introduction to polymers, particularly for students who are not planning on specializing in polymers. Furthermore, its style and level of complexity are such that it would make interesting and informative reading for the practicing engineer or scientist who would like to acquire some understanding of polymers and their behavior. For those desiring an in-depth understanding, there are a number of much more appropriate texts available, e.g., those by Billmeyer, Ritchie, Baer, etc.

K. L. DeVries, National Science Foundation

Encyclopedia of Electrochemistry of the Elements. Part I. Volume III. Edited by A. BARD. Marcel Dekker, New York, N.Y. 1975. 432 pp. \$60.00.

To provide, as the Introduction to this volume states, "a critical, systematic, and comprehensive review of the electrochemical behavior of the elements and their compounds" is a monumental task, and the present volume points out some of the difficulties inherent in such an ambitious effort. Each chapter is organized along the following lines: (1) standard potentials, (2) voltammetric characteristics, (3) kinetic parameters, (4) electrochemical studies, and (5) applied electrochemistry. The present volume has chapters on cobalt (Maki and

Tanaka), nickel (Arvia and Posadas), and phosphorus (Tomilov and Chomutov). This reviewer found a broad range of quality in this coverage.

The best and most useful chapter was that on Co (167 pp). The authors present a broad coverage of simple complexes and inorganic chelates of this metal in a manner which is clearly understandable. Discussions of mechanisms, however, often focus on work in which the voltammetry performed was polarography or oscillopolarography, and rather complex electrode mechanisms are written based on these data. Although useful working hypotheses can sometimes be derived from such an approach, such schemes should not be taken too seriously unless corroborative evidence is available. Other criticisms include: (a) in listing modern methods of measuring k_s values, no mention of ac polarography is made (p 116); (b) I was able to find no mention of the redox properties of square-planar cobalt dithiolates; (c) the discussions of inert and labile complexes on pp 60 and 154 are redundant; and (d) a nomenclature which involves use of the 3-oxidation state for cobalt. Even though the authors throw in a disclaimer (p 192) concerning the oxidation state formalism, this use of this formalism should not be encouraged.

The chapter on Ni covers 210 pages, with 780 references, and it is quite obvious that the authors put in quite an effort in its preparation. This chapter's value lies in the large number of references, rather than any critical evaluation of the data. In this regard, it was disturbing that I was able to find several important omissions, specifically involving electrochemistry of nickel-containing macrocycles or porphyrins, as well as nickel-carborane complexes. These bring into question the quality of the literature search. None of the 780 references was later than 1971, although the volume bears a 1975 copy-right.

The greatest virtues of the chapter on phosphorus (by A. Tomilov and N. Chomutov) are that abundant tables replace much of the text, and that it is over in 41 pages. Misuse of language obscures the meaning of many statements in this chapter and renders critical evaluation of the data almost impossible. For example, when discussing the reduction of phosphorus at a hanging mercury drop, the statement is made: "moreover, if the drop is washed with methanol, the peak height is reduced by an insignificant amount but is not eliminated altogether". In spite of the thorough listing and definition of symbols in the Editor's Introduction, this reviewer found several undefined symbols in the "Remarks" column of Table 2.1.1 (e.g., i_a/i_k , A_n , $n = 68\%$). In Table 2.2.1 there are six entries for the compound ($n\text{-NO}_2\text{C}_6\text{H}_4$)₃PO (sic) and in one case the Reversibility column has a value of 3.12 entered. The actual value of this Table is that it gives a literature reference which can be used to clear up the confusion.

In a broader sense, there is lack of consistency in reporting the most important aspects of the voltammetric work. For example, on page 9, in discussing the electroactivity of PCl_3 , the authors are careful to give the concentration range over which the reduction wave height is proportional to concentration, but fail to discuss other aspects of the work which are undoubtedly more significant. Finally, only three references after 1971 are given. This chapter is of limited utility and falls far below the standards set for this series.

William E. Geiger, Jr., *University of Vermont*

Catalysis: Progress in Research. By F. BASOLO and R. L. BURWELL, JR. (Northwestern University). Plenum Press, London and New York. 1973. xvi + 193. \$14.00.

"Catalysis" contains the summary and recommendations of a unique conference sponsored by the NATO Science Committee to stimulate interdisciplinary interaction among researchers in heterogeneous, homogeneous, and metalloenzyme catalysis. The 60 carefully chosen participants from Western Europe and North America are acknowledged leaders in these three related fields, and their assessment of needs for additional research represents the best advice available. By deliberately focusing attention on "what is *not* known rather than what is known", the book serves as a crystal ball for those responsible for planning research in catalysis. It is also an important reference document that should be in the files of agencies charged with selecting projects for funding in catalysis and related fields.

The book contains four parts. Each of the first three chapters broadly describes research accomplishments in one of the branches of catalysis, and the fourth contains reports of six working groups

designed to show contributions from each branch to selected topics. Intentionally chosen to maximize overlap among the fields, the special topics include: Kinetics and Mechanisms, Hydrogenation/Dehydrogenation, Nitrogen Fixation, Oxygen Activation, Hydrocarbon Activation, and Heterogenizing Catalysts. A relatively thorough and useful subject index completes the book.

In highlighting achievements in each of the three disciplines, the individual authors were very careful to define terms unique to their area and to avoid use of incomprehensible jargon. As a result, the chapters are generally quite readable. Some generality was sacrificed as each author described in detail a few reactions about which he was most knowledgeable, but this was necessary to keep the discussion as specific as possible on a molecular level, which was one of the stated objectives. The specific techniques that have been most productive in the various areas are mentioned, and some of the leading researchers are identified. While it is clear that enormous strides have been made toward understanding all forms of catalysis during the last several years, much remains to be learned about the exact chemical nature and concentration of active sites and the mechanisms of reactions they catalyze. The statement that "enzymes tend to make liars out of postulating biochemists" (p 28) can also be applied to most areas of catalysis, although increased fundamental understanding is making predictions in all areas more reliable.

That "cross-fertilization" among representatives of the three disciplines resulted is evident from the reports of the working groups in the last chapter. Their forced interaction pinpointed many similarities and common problems, as well as some significant differences among the groups. For example, homogeneous catalysts are almost inert toward "unstrained, saturated hydrocarbons", whereas "in heterogeneous catalysis the main problems are not so much concerned with the initial activation of C-H bonds as with the control of subsequent processes" that occur. Activation of thermodynamically stable molecules (e.g., dinitrogen) and selectivity of catalytic reactions to maximize yield of desired products are the two most important areas where attention should be focused.

It was generally agreed that in the future most commercially important new reactions will involve catalysts of one form or another. Because catalytic reactions will be extensively involved in production of fuels, synthesis of chemicals, manufacture of fertilizer, and control of atmospheric pollution (each of which has a heavy impact on the quality of life), the book strongly encourages expanded research in all branches of catalysis.

Although many topics related to catalysis (e.g., diffusion, surface physics, electrocatalysis, etc.) were not covered in the conference, the book should still be a valuable resource for people working specifically in these areas as it will give them an overview of the achievements, problems, and probable directions of future research in catalysis.

Joe W. Hightower, *Rice University*

Modern Electroplating, Third Edition. Edited by FREDERICK A. LOWENHEIM. Wiley-Interscience, New York, N.Y. 1974. 801 pp. \$29.95.

The third edition of "Modern Electroplating" published in 1974 should be useful to nearly all electrochemists and electroplaters.

The state-of-the-art is up to date and the fundamental principles are reviewed in the first chapter. The rest of the volume is dedicated to individual metals and alloys plating. The important metals like aluminum, cadmium, chromium, cobalt, copper, gold, indium, iron, lead, nickel, platinum, silver, tin, and zinc are reviewed in great detail along with such topics as preparation, difficult substrates, testing of deposits, stripping and electroless plating. The Appendix contains useful data on the physical properties, electrochemical equivalents, and standard potentials of various metals and plating solutions.

In the short time since I received the book for review, I must admit that I have used the book several times in the laboratory and in preparation for my courses on electrochemistry and corrosion.

Each chapter was written by an expert, and the assembly of over 40 contributors makes this book highly reliable and up to date.

This is a reference book which should be on the shelf and in the laboratory of most electrochemists, and I am sure that within a very short time of extensive use its pages will be spotted by the chemicals of the various plating solutions.

Jacob Jorné, *Wayne State University*