

## Book Reviews\*

**Advances in Enzymology, Volume 58.** Edited by Alton Meister. John Wiley and Sons, Inc.: New York. 1986. 345 pp. \$50.00. ISBN 0471-88013-2.

This most recent installment of *Advances in Enzymology* contains reviews covering artificial enzymes, superoxide dismutases, bacterial exotoxins with ADP-ribosyl transferase activity, succinyl-CoA synthetase, the  $\beta$ -keto pathway of leucine metabolism, reticulocyte lipoygenase, and stereochemical aspects of the reactions catalyzed by lipoygenases. The beginning chapter is a unique overview of enzyme model and mimic studies which have spanned the career of Ronald Breslow. It is written primarily from an organic chemical perspective. This is not some dry cataloguing, for the author clearly discusses the implication of the experiments as well as the thought process that preceded initiation of the experiments.

A chapter on bacterial protein toxins by Chun-Yen Lai makes fascinating reading. Diphtheria toxin, *Pseudomonas* exotoxin A, cholera toxin, *Escherichia coli* LT, and pertussis toxin are the primary topics. The enzymological and chemical aspects of these proenzymes and the targets which they ADP-ribosylate are detailed at length. Although a thorough account is provided, the author has taken care to clearly emphasize the most important similarities and differences between the toxins.

The remaining chapters are written more for a specialized audience. A novice in these fields will not find the reading as riveting as those chapters mentioned above. On the basis of this blend of chapters which are either pedagogically valuable or useful as reference material, Volume 58 is a worthwhile addition to any existing collection of *Advances in Enzymology*.

J. W. Frost, *Stanford University*

**The Biotechnological Challenge.** Edited by S. Jacobsson (University of Lund), A. Jamison (University of Lund), and H. Rothman (University of Warwick). Cambridge University Press: Cambridge. 1986. 181 pp. \$34.50. ISBN 0-521-30775-9.

Biotechnology from the particular perspective of the industrial capacities of developing countries is examined in the seven chapters of this book. Since genetic engineering requires a sophisticated technology, developing countries need to consider the technical, economic and social effects as well as health and safety measures before establishing biotechnology related industry. The industrial strategy should be based on a nation's strength and natural advantages and one needs to beware of duplicating what other nations are doing. Possibilities exist for extensive use of enzymes in developing countries where the expertise for production may not exist. An initial production of enzymes might be possible by extracting them from animal or plant material. Microbial enzymes might be produced by fungal cultures grown on solid media which would have lower capital costs than culture vessels. Cheap, disposable diagnostic tests utilizing enzymes could lead to improved health care.

Fermentation has been used for thousands of years and is the source of a variety of products from ethanol to food products and pharmaceuticals. To be successful, the bioprocess must offer technical and commercial advantages over competing processes. For example, the rising price of oil was responsible for the ethanol industry in Brazil.

The impact of isoglucose on the international sugar market is discussed as well as the use of single-cell protein as a food source. The last chapter is devoted to an analysis of ethanol production from biomass in Brazil. References, notes, and an index are included.

This book should be read by anyone considering a biotechnology project or investment in the third world. Not only does it provide an introduction to the principles and equipment involved in biotechnology but it also suggests strategies for determining whether a given process could be economically viable.

M. C. W. Smith, *Ann Arbor, Michigan*

**Theilheimer's Synthetic Methods of Organic Chemistry, Volume 40.** Edited by A. F. Finch. S. Karger Publishers, Inc.: Basel and New York. 1986. xxii + 1015 pp. \$494.75. ISBN 3-8055-4241-0.

In evaluating this very useful but inevitably expensive book, it is proper to consider that it is a service, analogous to Chemical Abstracts Service, and its price must be viewed in that light, and not be compared to the price of other books. The content is highly compressed, and the amount of information on any page is far higher than that in ordinary books. The abbreviated, almost cryptic abstracts focus on synthetically useful

transformations, giving reagents, essential conditions, representative yields, and sometimes a statement about utility. Organization is, as always, according to the type of transformation, using a classification system developed for the series, based on what kinds of bonds are broken and what kinds are formed. These entries occupy 736 pages. The index, cumulative for Volumes 36-40, is itself a major entity, consisting of 247 pages having three columns to a page (one can find anything in an index that is such as epitome of thoroughness!).

The content of Volume 40 is drawn mostly from the literature of 1984, and part of 1985. In addition, some supplementary references for earlier volumes are included. As usual, an essay on "Trends in Synthetic Organic Chemistry" precedes the abstracts. Although it is only four pages long, it is not trivial thing, and it is written with insight. It describes the characteristics of the forest, of which the abstracts make up the trees. "Theilheimer" has an established place among the informational tools available to organic chemists, and no library that caters to their needs can claim to be adequate without it. With eight cumulative indexes covering together 40 years, this work is a wide window looking on the synthesis scene, and with its timeliness, it is an effective aid for awareness of recent developments. It is a pity, but perhaps unavoidable, that it must carry a price that induces libraries to keep it under lock and key.

**Solubility Data Series, Volume 25: Metals in Mercury. Volume 26: Sulfites, Selenites, and Tellurites.** Volume 25: Edited by C. Hirayama, Z. Galus, and C. Guminski. Pergamon Press: Oxford and New York. 1986. xii + 451 pp. \$100.00. ISBN 0-08-023921-8. Volume 26: Edited by M. R. Masson, H. D. Lutz, and B. Engelen. Pergamon Press: Oxford and New York. 1986. xxiii + 451 pp. \$100.00. ISBN 0-08-032517-3.

Volume 25 presents critically evaluated solubility data for nearly every element in mercury; carbon, silicon, and boron are included, but from group 16, only tellurium has been selected.

Volume 26 is nearly 75% devoted to sulfite salts, principally of the alkali and alkaline earth elements. Selenites occupy about 20% of the pages, and tellurites about 5%. The data are overwhelmingly for solutions in water; wine is not mentioned.

Like volumes of this series previously reviewed in this Journal, the best published values are listed with full documentation and appropriate information on purity, experimental methods, and reliability.

**Advances in Inorganic and Bioinorganic Mechanisms, Volume 4.** Edited by A. G. Sykes (University of Newcastle). Academic Press, Inc.: Orlando, FL. 1986. viii + 298 pp. \$105.00/£65.00. ISBN 0-12-023804-7.

As the editor states in the preface of Volume 1, the aims of this series are to provide critical and authoritative reviews on mechanisms of inorganic reactions and to cover the new and rapidly expanding area of bioinorganic mechanisms. The text of Volume 4 in this series is composed of six reviews, two of which are concerned with bioinorganic topics, namely, heme iron center in cytochrome P-450 and reactions of gold(III) complexes, while the other four are devoted to mechanisms of redox and ligand substitution reactions of halogens, transition metals, trivalent lanthanide ions, and the actinide elements.

The first article examines the heme iron coordination structure of the monooxygenase enzyme cytochrome P-450 in the light of spectroscopic data, with special emphasis on electronic absorption and magnetic circular dichroism spectroscopy. Selected aspects of the mechanism of electron transfer to heme iron and breakdown of the oxygenated intermediate have been highlighted. This review (57 pages, 256 references) is a modest addition to the extensive number of articles already published on cytochrome P-450. Heavier halogens and several salts of oxohalogen anions have been widely used in redox reactions. The reaction mechanisms of such species in acidic aqueous solutions are reviewed in the second article. A few oscillating reactions are also included. Formation and solution structures of EDTA complexes of transition metals and electron-transfer reactions involving metal-EDTA complexes are reviewed in article number 3. The brief discussion on reactions of EDTA complexes with peroxide and superoxide ions is useful. The fourth article is a relatively rare review which exclusively focuses on the reactions of gold(III) complexes. Attempts to develop new antiarthritic drugs have prompted renewed interest in gold(I) chemistry. However, the marked acidity and strong oxidizing power of gold(III) complexes have been utilized in catalytic oxidation of organic compounds such as sulfides and could be developed further. This review will prove helpful in such pursuit. Mechanisms of redox and complexation reactions of several actinide

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

elements are briefly (29 pages, 93 references) reviewed in article number 5. This work is intended, in part, to selectively update and expand an earlier work by another author published in 1975. For the first time, rate equations, rates, and thermodynamic parameters for reactions in aqueous solution are tabulated. The sixth (and last) article is relatively long (66 pages, 208 references) and reviews the solvent exchange and substitution reactions of trivalent lanthanide ions in aqueous and nonaqueous solutions. Discussions on debatable topics such as the value of  $n$  in  $[Ln(\text{solv})_n]^{3+}$  ( $\text{solv} = \text{H}_2\text{O}$ , DMF, etc.) and labilities of complexes with varying coordination numbers (6 to 10) are delineated in an excellent manner. In fact, mechanistic interpretations are very clearly presented in all six articles.

The six reviews included in Volume 4 are of moderate size. Nevertheless, they highlight significant advances in respective areas with necessary references. The articles will be useful as reference materials for a graduate-level course on mechanisms of inorganic reactions and also will serve as excellent guides to those directly involved in research.

Pradip K. Mascharak, *University of California, Santa Cruz*

**Probabilistic Properties of Deterministic Systems.** By A. Lasota (Silesian University) and M. C. Mackey (McGill University). Cambridge University Press: Cambridge, 1985. x + 358 pp. \$49.50. ISBN 0-521-30248X.

Probabilistic properties of deterministic systems are of increasing interest in many fields of chemistry, including the boundary areas of biochemistry and neurosciences. The book under review is not the one, however, that chemists will find of much, if any, use. It appears to be written by mathematicians for mathematicians and the vast majority of the references are to the mathematical literature.

A number of didactic books on this general topic have appeared lately, which chemists of all persuasion will find more useful as surveys of the field. Some examples are the following: *Deterministic Chaos*, H. G. Schuster, Physik-Verlag, 1984; *Regular and Stochastic Motion*, A. J. Lichtenberg and M. A. Leiberman, Springer Verlag, 1983; *Chaos in Nonlinear Dynamical Systems*, J. Chandra, Ed., SIAM, 1984.

The above comments are not meant to denigrate the importance of sophisticated mathematical tools and mathematical rigor in the development of this relatively new and interesting field. This review addresses the question of the sources of information which might be useful to readers of *this Journal*.

Kurt E. Shuler, *University of California, San Diego*

**Advances in Heterocyclic Chemistry. Volume 39.** Edited by A. R. Kartzitzky. Academic Press: Orlando, FL, 1986. vii + 393 pp. \$98.00. ISBN 0-12-020639-0.

By the time Volume 39 of any series appears, it is not surprising that some parts of earlier volumes have become out of date. It has been a commendable policy in this series to include supplementary chapters to bring older ones up to date. In this volume, that is done by J. G. Keay for reduction of nitrogen heterocycles with complex metal hydrides and by K. Jankowski, J. R. J. Paré, and R. H. Wrightman for mass spectrometry of nucleic acids (including nucleosides).

Four new subjects appear in this volume. One is on azapurines, by A. Albert; one is on metallacycloalkanes and -alkenes, by E. Lindner; another is on tricyclic compounds with a central pyrimidine ring and one bridgehead nitrogen, by I. Hermezc and L. Vasvári-Debreczy; and the fourth is on the application of aziridines to the synthesis of natural products, by T. Kametani and T. Honda. Most of these reviews do not carry an explicit statement of the coverage of the literature, although one reviewer tells the reader that his coverage is complete through 1983 with some 1984 references, and occasional references dating 1985 can be found in some of the chapters.

The cumulative index of titles for the series now requires 7 pages. The text is nicely typeset, and the formulas are well drawn (although in jarringly different styles from one chapter to another). References are conveniently given at the bottom of each page, a feature that saves a lot of bother.

**Thermochemical Data of Organic Compounds. Second Edition.** By J. B. Pedley, R. D. Naylor, and S. P. Kirby (University of Sussex). Chapman and Hall: London and New York, 1986. xii + 792 pp. \$120.00. ISBN 0-412-27100-1.

This work is a comprehensive effort to provide organic chemists and chemical engineers with the thermodynamic basis for predicting the

feasibility of a given reaction. The major portion of the book consists of a table of "Selected values of  $\Delta_f H^\ominus$ " for about 3000 compounds, and "Experimental thermochemical data" for enthalpies of reaction for a very large number of processes. About one-tenth of the book is discursive and is devoted to the prediction of standard enthalpies of formation for compounds for which values are not known. Thirty-nine pages of references and "indexes" that correlate empirical formulas with names, and CA Registry Numbers with formulas, complete the book.

**Enthalpies of Vaporization of Organic Compounds: A Critical Review and Data Compilation.** Edited by Vladimír Majer and Václav Svoboda (Institute of Chemical Technology, Prague). Blackwell Scientific Publications: Oxford and Boston, 1986. 300 pp. \$38.00. ISBN 0-632-1529-2.

The work is offered as "the first comprehensive and truly critical compilation of enthalpies of vaporization of pure organic substances", and it is the culmination of a project of the IUPAC Commission on Thermodynamics. The first 64 pages take up basic relationships and definitions and methods. The remainder of the book consists of tables with associated introductory text. The entries in the tables are in formula-index order and give  $\Delta H_v$  at a variety of temperatures, together with references to the source of the data. Compounds can also be located by means of a name index, which uses IUPAC naming (e.g., "aniline", "triethylamine", "dipropyl ether", etc.) with cross-references and is refreshingly easy to use.

**Organic Solvents: Physical Properties and Methods of Purification. Fourth Edition.** By John A. Riddick, William B. Bunger, and Theodore K. Sakano. John Wiley & Sons: New York, 1986. xviii + 1325 pp. \$95.00. ISBN 0471-08467-0.

This new edition comes 16 years after the previous one, and it has about 30% more pages. The format remains the same: tables of compounds arranged by structural type list all manner of useful properties, including not only melting and boiling points but density, refractive index, heat capacity, dielectric constant, etc. For this edition, six more properties have been added, including compressibility properties and thermal conductivity. The second part of the book is devoted, as before, to methods that have been reported for the purification of individual compounds, with the results of the processes. Although this is very helpful, it is not as satisfying as it might be, for there is little or no critical evaluation when several methods are described. The increased size of this edition is largely due to the inclusion of 150 solvents that were not listed before. Another change is in the references (over 7000!), where the method of citing has been altered to match that used in Chemical Abstracts (year, volume, page, rather than volume, page, year). This must have been a lot of work; was the gain in utility really worth it? In any event, the publishers are to be commended for having selected very clearly distinguishable type faces for the numerals used for the year, volume, and pages.

**Handbook on the Physics and Chemistry of Rare Earths. Volume 8.** Edited by Karl A. Gschneidner, Jr., and LeRoy Eyring. North-Holland Physics Publishing: Amsterdam and New York, 1986. x + 382 pp. Dfl 240.00. ISBN 0-444-86971-9.

Many readers will find that their expectations aroused by the word "handbook" in the title are not met by the content, for the work is an open-ended series in which each volume includes widely divergent topics, without an apparent overall plan. In this volume there are four: Intra-Rare-Earth Binary Alloys, by Gschneidner and Calderwood; Polarographic Analysis of the Rare Earths, by Gao; Inorganic Complex Compounds I, by Leskelä and Niinistö; and Implications in Organic Synthesis, by Long. They are all important and appropriate, but it is hard to imagine any single chemist being strongly interested in more than one of them. This is a book for library purchase.

Access to the content of this volume is provided by a subject index. It is rather short, and many terms found in the text are not entered. The content of previous volumes is listed according to volume, with chapter titles. A cumulative index, even if only of titles, would greatly increase the usefulness of this work, but with an open-ended plan, it does not seem likely that one can be provided, except at intervals. The dates on which the reviewers terminated their coverage of the literature are not explicitly stated, but many references to 1984 can be found. Presentation is excellent, with very clear figures and formulas. Nomenclature is occasionally idiosyncratic, as in the use of "diiodosamarium" for samarium diiodide (the index sensibly uses only the latter).