

Book Reviews*

Kinetics Applied to Organic Reactions. By Wiendelt Drenth (University of Utrecht) and Harold Kwart (University of Delaware). Marcel Dekker, Inc., New York and Basel. 1980. IX + 207 pp. \$19.75.

Once a reader has finished the Preface of this book he will find that he can continue reading only if he rotates the volume clockwise by 90°, or else inclines his head at a similar angle to the left. The reviewer recommends the former technique to those who read more than a few pages, but he doubts if there will be many such readers.

The volume is described by the publisher as a "textbook... designed to be used as the basis for a tutorial course or a self-taught review course focusing on the application of kinetic tools in elucidating reaction mechanisms". There are chapters entitled: Kinetic Equations; Experimental Procedures; Theory of Reaction Rates; Isotope Effects; Fast Reactions; Catalysis; and Chain Reactions. Treatment of these topics is uneven. There are no problems or exercises for the student's attention, nor is there any effective bibliography. Few of the illustrations are of much value, and some are curiously primitive. The book does not appear well-suited for the task that the publisher assigns it.

Of what value to a graduate student is a chapter like the one entitled Catalysis that reproduces 26 typescript pages of text containing nine references to the primary literature, only two of which are more recent than 1961? Surely researches of the past 20 years have advanced the study of catalysis to a point well beyond that described. The chapter on Chain Reactions cites the original literature exactly twice!

Here and there one encounters the useful insights that one would expect from authors who are active in the study of reaction mechanisms. Too often, however, the treatment is sketchy. As a set of lecture notes this volume could be the starting point for a kinetics course. As a textbook it falls short of traditional standards.

Martin Stiles

Hormonal Proteins and Peptides. Volume 8. Prolactin. Edited by C. H. Li (University of California). Academic Press, New York. 1980. xiv + 231 pp. \$29.50.

Volume 8 entitled "Prolactin" is an excellent addition to a fine series of texts on hormonal proteins and peptides. Truly one of the more remarkable and versatile of all biologically active peptides, this pituitary hormone is given a thorough authoritative review in four selective chapters by leading investigators in their fields of expertise. A fifth chapter by Roy O. Greep presents a biography of the work of F. L. Hisaw and H. B. Van Dyke, two of the pioneers in the research on the reproductive hormones.

The first chapter is written by C. H. Li, who has made major contributions in our understanding of the chemistry of prolactin. Comparisons of amino acid structure are presented, with the aid of tables, for prolactin isolated from different species, and for closely related pituitary peptides. Key elements in the primary structure and their reactions with specific reagents are discussed and the peptide structures are related to the biological and immunochemical properties of prolactin.

The mammary gland cell with respect to growth and milk secretion is described by J. J. Elias in Chapter 2. The multiplicity of endocrine factors and cell mediators is stressed, and in particular, the role of prolactin and its interaction *in vitro* with other hormones in cell culture systems is reviewed.

In Chapter 3, the current status of prolactin and mammary tumor induction is reviewed by K. H. Clifton and Jacob Furth. This was one of the last of many important contributions by Jacob Furth to the field of tumor growth and regulation before his death in 1979. The involvement of prolactin in human breast cancer as well as in neoplasms of other tissues is stressed. This aspect remains a major problem for investigators in cancer research.

Approximately one-half of this volume on prolactin consists of a comprehensive review in Chapter 4 by W. C. Clarke and H. A. Bern on the comparative endocrinology of this ubiquitous and fascinating peptide. These authors, who have contributed so much to this field, have managed to document the versatility of prolactin and to integrate a vast range of biological actions in animals, from mammals to the lower vertebrates. There is a clear exposition of data relevant to biological actions in different species, and, in addition, of speculation for future research which would help to unify the many concepts currently held.

One minor criticism of the text could be made. In view of the previous dominant role exerted by Professor Li in persuading his colleagues to standardize the use of the term *tropic* for *trophic* as applied to pituitary hormones, he missed a similar opportunity to reduce the proliferation of abbreviations and the style of nomenclature used for prolactin and similar substances. It was disappointing to observe the variety of terms applied to the same substances in different chapters of this volume.

In a relatively small volume, this text successfully brings together important current information on the chemistry, biology, and functions of prolactin in sufficient detail to satisfy the requirements of research investigators, students, and clinicians. Each chapter contains an extensive list of references through 1978 in the four major areas which are reviewed. This volume will serve as the standard reference for a number of years for those who intend to initiate studies on prolactin.

Frank Ungar, *University of Minnesota*

Ion-Selective Electrodes in Analytical Chemistry. Volume II. Edited by Henry Freiser (University of Arizona). Plenum Press, New York. 1980. xi + 291 pp. \$35.00.

As part of the "Modern Analytical Chemistry Series" (David Hercules, series editor), this book continues where Volume I leaves off by presenting comprehensive up-to-date reviews in the field of ion-selective electrodes (ISE). Particular emphasis is given to recent technological developments in design and application of ISE's. The volume, edited by a renowned ISE expert, is comprised of four chapters authored by leading ISE researchers.

Robert K. Kobos systematically reviews the expanding area of enzyme and other biocatalyst-based potentiometric sensor systems. Coverage includes basic enzyme kinetics considerations, applications of soluble enzyme reagents, immobilized enzyme electrodes, and even the latest concepts of immuno- and cellular bio-electrodes. Electrodes selective for particular amino acids or similar compounds are discussed in detail with regard to selectivity, sensitivity, response times, etc. Complete tables and fine illustrations of electrode design as well as typical response curves complement this excellent chapter.

In chapter two, Henry Freiser reviews the preparation, theory, and applications of the intriguing concept of coated wire ISE's (CWE). Citing most of his pioneering work in this area, this section attempts to shed some light on the possible mechanism of response of these novel devices by discussing fundamental membrane conductivity experiments. Details on typical CWE construction and response properties are also provided. Similarly, Jiri Janata and Robert J. Huber discuss the evolutionary extension of CWE's by reviewing the latest in ISE technology, namely chemically modified field effect transistors (CHEMFETS). These devices are prepared by coating an appropriate ion-selective membrane material on a gate of a field effect transistor. A rigorous treatment of the response theory of such devices is given along with the methods involved in their construction and analytical application. Potentially exciting applications in the biomedical area with regard to immuno-responsive and micro-sized CHEMFETS are also described.

Finally, Richard P. Durst and co-workers have put together an exhaustive compilation of ISE literature, in table format, dating back to the earliest glass pH electrode work. Fifteen tables are presented, each headed by the class of ISE or application involved and each organized in a chronological fashion. Approximately 2000 references are cited, including important patented breakthroughs within the field. This chapter provides an invaluable place for ISE users and researchers to rapidly scan the literature pertinent to their specific needs. Indeed, the entire volume is a well-written, carefully organized compilation of ISE information and it is a welcome addition to the ISE literature.

M. E. Meyerhoff, *The University of Michigan*

Low-Temperature Properties of Polymers. By I. Perepechko (Moscow Automotive Engineering Institute). Pergamon Press, New York. 1980. ix + 301 pp. \$40.00.

The theme of this book is low-temperature dynamics of polymer chains and related properties such as heat capacity, thermal expansion, mechanical and dielectric relaxation, etc.; these are presented in what amounts to a series of review articles. The subjects covered (in the corresponding chapters) are as follows: Heat Capacity (Chapter 1); Thermal Conductivity (Chapter 2); Thermal Expansion (Chapter 3);

*Unsigned book reviews are by the Book Review Editor.

Electrical Properties, mainly dielectric relaxation (Chapter 4); Nuclear Magnetic Resonance, mainly low-temperature second moments (Chapter 5); Dynamic Mechanical Properties (Chapter 6); and Acoustical Properties (Chapters 7-9). Also included is a listing of 394 references (through 1974; this is a translation of the 1977 Russian edition), an appendix of eight tables of thermal properties, and comprehensive indices of subjects and authors.

Professor Perepechko has provided what are for the most part interesting introductions to the above-mentioned fields; potential readers will appreciate that many of these subjects are fundamental to our understanding of polymer physics, but have been overlooked by the majority of polymer researchers. Each chapter is introduced by a somewhat qualitative but understandable presentation of the relevant physics. This is followed by theories pertaining to polymers, then by a discussion of experimental results on specific polymers. From these discussions it becomes clear that the low-temperature properties of polymers are incompletely understood, qualitative explanations notwithstanding. This reviewer wishes that the author had been a bit more critical of the various approaches presented. In the same vein, a conclusion for each of the chapters would have been helpful for emphasizing the major points.

In summary, "Low-Temperature Properties of Polymers" concisely reviews the area of its title. It would be useful as a supplemental text in a polymer physics course, or as a good study source for researchers starting low-temperature studies of polymers. It should be pointed out that the printing quality is substandard. While there are many typographical errors, broken type faces, etc., these do not impede the reader's understanding of the material.

Buckley Crist, Jr., *Northwestern University*

Isotopes: Essential Chemistry and Applications. Edited by J. A. Elvidge and J. R. Jones (University of Surrey). The Chemical Society, London. 1980. xii + 400 pp. \$32.00.

Special Publication No. 35 of The Chemical Society contains ten lectures delivered at a review symposium sponsored by the Education Division in July 1979. Preparation, analysis, and applications of both stable and radioisotopes are included. Most of the articles concern hydrogen and carbon isotopes in organic chemistry. There are chapters on ^2H , ^3H , and ^{13}C NMR and on mass spectrometric analysis. Selected applications are made to hydrogen isotope exchange reactions, organic reaction mechanisms, biosynthesis, drug metabolism, and medical chemistry. Phosphorus isotopes receive little mention. The paperback volume contains no indexes.

R. Bruce Martin, *University of Virginia*

Biomedical Polymers; Polymeric Materials and Pharmaceuticals for Biomedical Use. Edited by Eugene P. Goldberg (University of Florida) and A. Nakajima (Kyoto University, Japan). Academic Press, New York. 1980. xii + 457 pp. \$32.00.

This volume contains the collected papers based on the symposium presented on April 4-6, 1979, at the First Joint Congress of the American Chemical Society and the Chemical Society of Japan in Honolulu. This cooperative Japan-U.S. conference afforded a unique opportunity to bring together polymer and biomedical scientists in biomedical polymer science. The 17 chapters in this volume are expanded and updated from the original papers, of which seven papers are the contribution of Japanese researchers.

The Research Association for Artificial Organs was founded in 1957 in Japan, mainly by clinicians; in 1963 it was reorganized as the Japan Society for Artificial Organs, involving medical and materials scientists.

The research project of Fundamental Studies on Biomedical Polymer Materials was founded in 1977 and some of the research were included in this volume.

The topics covered range from polymer implant and prosthetic materials to tissue-polymer interfaces, polymeric drugs, polymers in agriculture, and bipolymer synthesis in the well balanced form.

In the evaluation process of biomedical polymers *in vitro*, the simplified test in the system of a biochemical environment often results in the lack of a close correlation with the clinical test of real *in vivo* applications. It is mainly because the important factors in an actual living body are often neglected or over-simplified in the experiment.

For example, in the study of a blood compatibility test *in vitro*, the evaluation system is over-simplified in biochemical reactions. Although it is important to determine the reaction from the academic viewpoint, it is often the case that the resultant information does not fit well with respect to the correlation with the actual application for clinical test.

It is indispensable to design and perform the research project in an experimental system of higher dimension with respect to all components, as well as the whole animal.

In the case of the blood clotting test, as another example, the essential mechanism of thrombogenic formation on the substance surface is not clearly determined yet. It is necessary to study the mechanism of the blood clotting process with respect to the basic approach of thermodynamics and other highly sophisticated systems of higher dimension. The rapidly expanding field of biopolymer research desperately needed a series of this scope and depth. This volume is highly recommended to researchers in order to stimulate new approaches to the solution of such key problems as: (1) physical, chemical, and surface properties that most influence physiological acceptance in soft or hard tissue or in contact with blood; (2) *in vitro* methods to provide correlation with *in vivo* blood compatibility or implant acceptance; (3) polymer molecular weight and structural influence upon drug pharmacology for polymer-drug conjugates; (4) mechanisms for tissue, metabolite, bacteria, or blood cell adhesion to polymer surfaces.

It would be worthwhile to publish, in an up-dated form, this Biopolymers book series, in the near future.

Naoya Yoda, *Toray Industries (America), Inc., New York*

Inorganic Chemistry in Biology and Medicine. American Chemical Society Symposium Series. No. 140. Edited by Arthur E. Martell. American Chemical Society, Washington, D.C. 1980. viii + 436 pp. \$39.50.

This volume is derived from a symposium sponsored by the Division of Inorganic Chemistry and held in September of 1979. It has thus taken longer to appear than could reasonably be expected.

The emphasis of this collection of 22 articles is on the medicinal aspects of inorganic chemistry. As such it is distinct from most of the volumes which have appeared on the topic of bioinorganic chemistry. Many of the articles describe the uses of various metal complexes and ligands in biological systems and review the clinical problems for the uninitiated chemist. As such this collection will be useful to inorganic chemists who want to better understand the medical application of the complexes they develop and study. Other articles emphasize some of the inorganic principles which are being applied to the development of complexes and ligands for medicinal applications. Whether the authors are more involved with inorganic or biological chemistry, they demonstrate knowledge of both areas, indicating that the field is maturing.

Topics treated include radiopharmaceuticals, especially those using technetium, carcinogenesis and anticancer activity of metal complexes, especially di-dichlorodiammineplatinum(II), ligand design and chelation therapy for iron, copper, and other metal overload conditions, ionophores, and trace metal significance. One especially good chapter treats the biological distribution of chloroammineplatinum(II) complexes and discusses extensive, new results in terms of the thermodynamics and kinetic properties of the complexes.

Scot Wherland, *Washington State University*

Phosphorus Chemistry Directed Toward Biology. Edited by W. J. Stec. Pergamon Press, Oxford and New York. 1980. vii + 231 pp. \$60.00.

This volume contains the lectures presented at the International Symposium on the title subject held in Poland in 1979. There are 22 papers, reproduced directly from the authors' typescripts in many different typefaces. The topics vary from very simple compounds, such as monomeric methyl metaphosphate, to such ones as phosphorus in bacterial cell walls, and the chemical synthesis of DNA. Some of the papers are little more than abstracts, whereas others are quite substantial, such as the 18-page contribution on ^{31}P NMR of intact tissue. There is no index, and not even a list of contributing authors.

Pyrolytic Methods in Organic Chemistry. By Roger F. C. Brown (Monash University, Australia). Academic Press, New York. 1980. 347 pp. \$38.50.

The author has presented an impressive collection of thermal reactions of organic compounds covering the temperature range from about 300 °C up to 1200 °C. For stimulation of interest in thermal reactions in synthetic methods the book will very probably succeed admirably. The author's selection of examples gives a good balance between simplicity and breadth of application which allows the reader to obtain a feeling for the type of reaction without losing interest in detail. Reactions are classified broadly into types, for example, elimination reactions, rearrangements without fragmentation, and examples of each classification are illustrated from a wide range of compounds. References at the end of each chapter are extensive.

The chapter on apparatus will be helpful to those entering the field. The author rightly stresses the importance of working at short contact

times and low pressures to obtain primary decomposition products. Some of the experimental problems which can lead to nonreproducible results, such as the presence of small quantities of oxygen, the contribution of surface effects, and poor control of pressure or flow rate, are perhaps not sufficiently discussed.

To a physical chemist the lack of quantitative data makes the subject matter rather unsatisfactorily, but this fault probably lies with the original work rather than the compilation. The author has not mentioned rate constants and seldom has referred to activation energies or heats of reaction. Mechanisms are given only brief consideration. The author does attempt to point out similarities or special relations between reactions in different chapters and this leads to a degree of continuity which can be achieved only when a book is the work of one person.

In summary, the author has provided a comprehensive, clear, and useful summary of the role of thermal reactions in organic chemistry. His purpose should be adequately realized.

Margaret Back, *University of Ottawa*

Introduction to Phosphorus Chemistry. By Harold Goldwhite (California State University, Los Angeles). Cambridge University Press, New York, 1981. xii + 113 pp. \$30.00 hardbound; \$12.95 paperbound.

This little book presents a summary and overview of a subject in which substantial advances of both a practical and theoretical nature have been made in recent years. Both inorganic and organic aspects are covered. The presentation is concise, and the pages are filled with about as much area devoted to formulas and equations as to the text. Developments through June 1979 are included.

The treatment is critical and selective, and effectively gives the reader a quick appreciation of the varied types of structures and the versatile reactivity of phosphorus compounds. The book grew out of a series of university lectures, and is suitable for advanced undergraduates, graduate students, and established chemists who want to know something about the field. There are no references to the primary literature, but there is a well-selected bibliography of reviews and books for those who want more detailed information.

A Search for Structure. By C. S. Smith. M.I.T. Press, Cambridge, Massachusetts, 1981. x + 410 pp. \$30.00.

The title of this fascinating book may lead organic chemists or solid-state scientists to believe it contains something for them, and it does, but not what they would expect. It is a philosophic exploration of the origin of scientific and technological discovery, which the author believes is bound up with esthetic curiosity. The emphasis is heavily tipped toward metals, and the relation between their properties and the technological and esthetic applications of them. It is richly illustrated, with subjects ranging from sliced ingots of crystallized stearin to mosaic tiles at the Alhambra. It is a phenomenally wide-ranging tour de force from which any chemist interested in the philosophic foundations and implications of the scientific profession might benefit.

The Chromatography of Hemoglobin (Clinical and Biochemical Analysis Series). Volume 9. By Walter A. Schroeder and Titus H. J. Huisman. Marcel Dekker, Inc., New York, 1980. 256 pp. \$29.75.

Hemoglobin is the best studied protein molecule in existence. However, in spite of the fact that its structure is now known to atomic dimensions, hemoglobin's precise "mechanism" has been elusive. Scientists continue to explore the fine details of structure, function, and assembly of this interesting molecule. The fact that hemoglobin is so well studied has made this protein particularly useful to biological chemists who seek to learn basic principles of protein chemistry. This gives credence to the rumor that, at a certain point, grant administrators at the National Institutes of Health declared hemoglobin to be an "honorary enzyme".

In the volume "The Chromatography of Hemoglobin", Schroeder and Huisman use hemoglobin as a model of a globular, soluble protein. They deal with this model protein in exquisite detail with respect to the various kinds of ion-exchange chromatography techniques for protein purification which have been developed in the past 2 to 3 decades. The descriptions include macrochromatography (a chromatographic procedure used mostly for preparative purposes) and microchromatography (used mostly as an analytical tool). This book then might be of great potential use not only to those who study hemoglobin but also to those who wish to use chromatographic procedures in protein chemistry—both at the level of preparation and analysis. Although the methods apply specifically to hemoglobin, they certainly can be applied to many other protein systems. Chromatography using Amberlite IRC-50, CM-Sephadex, CM-cellulose, DEAE-cellulose is discussed. Helpful comments about the advantages and disadvantages of these various ion exchangers and various types of

chromatographic developers are discussed.

It is impressive to this reviewer that the book is written in such a fashion that someone inexperienced with hemoglobin chemistry could follow the step-by-step guides and successfully carry out qualitative and quantitative experiments with hemoglobin. This fact may be particularly useful considering the increased interest in applying chromatographic methods to isolate human hemoglobin variants and to quantify the minor components of human hemoglobin. The minor hemoglobin components appear to be of particular interest in the sense that their quantitation may be important in various pathologic human states.

The book is liberally interspersed with figures and extensive reference lists. The appendix, which contains information on the numerous human hemoglobin variants that have been quantitated and/or isolated by ion exchange chromatography, will be primarily of use to chemists directly involved in hemoglobin studies. The figures, references, and appendix include information which is relatively up-to-date.

Given the fact that hemoglobin and its chromatography are being used as a model, one might ask how transferable the hemoglobin chromatography information is to other protein systems? Technology transfer to systems other than man are well demonstrated in the final chapter in the book "Chromatography of Animal Hemoglobin". This chapter clearly demonstrates that information on chromatography of human hemoglobin systems is readily transferable to the hemoglobin systems of other organisms. It is not beyond the realm of practicability that many of the principles and methods outlined in "The Chromatography of Hemoglobin" will find application in a wide variety of soluble globular enzymes.

Joseph Bonaventura, *Duke University Marine Laboratory*

Controlled Release of Bioactive Materials. Edited by R. Baker. Academic Press, New York, 1980. viii + 473 pp. \$34.50.

This book is one of the more recent ones on using polymeric materials for controlled release of drugs and other biologically active compounds. The book is based on presentations at the Sixth International Symposium on Controlled Release Materials. After a theoretical introduction by the organizers of the symposium, there are eight chapters dealing with release of drugs. Most of these have been published before or released in one way or another, but some of them still are of interest, such as the osmotic pump or the transdermal drug delivery. Typical for a field of economical importance, more of the specifics are not given and some of the chapters clearly indicate that they do not want to give their best formulation away. This fact reduces the value of the otherwise interesting presentation. The last 14 chapters deal with a variety of agricultural applications of the controlled release forms. This is a rather important field and applications of these methods are and will be of importance in release of pesticides, growth factors, pheromones, etc. There are three chapters dealing with some theoretical aspects of the controlled release as well as new types of polymeric delivery esters. Although not a landmark, this book is a necessary addition to the field of controlled release of bioactive materials.

Nicholas Bodor, *University of Florida*

Cellular Receptors for Hormones and Neurotransmitters. Edited by Dennis Shulster (National Institute for Biological Standards and Control, London) and Alexander Levitzki (Hebrew University, Israel). John Wiley & Sons, New York, 1981. XX + 412 pp. \$77.00.

In their preface to "Cellular Receptors for Hormones and Neurotransmitters" the editors point out that the book is aimed primarily at the advanced student who wishes to gain some basic knowledge in what is known as "receptorology", rather than the research investigator working on particular receptors. This specific aim is rather well achieved in the first section of the book which is devoted to the general properties of receptors and the methods currently available to study them. In the later section, individual receptors are discussed in detail. This latter section reviews three families of receptors—intracellular hormone receptors, cell-surface receptors for hormones, and cell-surface receptors for neurotransmitters. In general the authors have reviewed their receptor field rather than present detailed research data. Also, the articles each contain a structure-activity relationship description of the hormone/neurotransmitter. There is a subject index at the end of the book.

In recent years there has been an enormous expansion in our knowledge on the cellular receptors for low-density lipoprotein and the epidermal growth factor, and on the affinity labeling/cross-linking techniques used for receptor studies. The book does not review these topics. Despite these omissions, the book remains an excellent source book both authoritative and thoroughly referenced in the field of receptor research.

Manjusri Das, *University of Pennsylvania*