

Book Reviews

ERRATUM

In the review, "Mass Spectrometry of Metal Compounds", published in the March 28, 1979, issue (p 1909), the publisher should have been listed as Butterworths, London and Boston, and the price as \$34.95.

BOOKS RECEIVED

Process-Control Systems. Second Edition. By F. G. SHINSKEY. McGraw-Hill, New York. 1979. xiii + 349 pp. \$22.50.

Designed for the practicing engineer; deals with control and monitoring of chemical reactions, energy transfer, etc.

Heteroepitaxial Semiconductors for Electronic Devices. Edited by G. W. CULLEN and C. C. WANG. Springer-Verlag, New York. 1978. xi + 299 pp. \$69.00.

Concerned with the properties of semiconducting thin films such as silicon films.

Nuclear Methods. Monograph Series 1. Introduction to Radioanalytical Physics. By G. DECONNINCK. Elsevier Scientific Publishing Co., Amsterdam. 1978. 242 pp. \$49.75.

Designed as a textbook for scientists and engineers of diverse backgrounds; covers radioanalytical methods other than neutron activation.

Introduction to Chemistry. Third Edition. By T. R. DICKSON. John Wiley & Sons, New York. 1979. xiii + 465 pp. \$15.95.

Additives for Plastics. Volume 1: State of the Art; Volume 2: New Developments. Edited by RAYMOND B. SEYMOUR. Academic Press, Inc., New York. 1978. Vol. 1: viii + 279 pp; \$17.50. Vol. 2: x + 125 pp; \$9.50.

These books are concerned with formulations using various fillers, pigments, plasticizers, flame retardants, etc. Vol. 1 is meant to describe the state of the art, and Vol. 2 is oriented toward research and new advances. The volumes are separately indexed.

A Clinical Companion to Biochemical Studies. By VICTOR SCHWARTZ. W. H. Freeman and Co., San Francisco. 1978. xiii + 114 pp. \$15.00, cloth; \$7.50, paper.

Purposes to show the importance of biochemical considerations in clinical medicine by means of a group of case histories that are related to identified biochemical abnormalities.

Biochemical Systems Analysis. A Study of Function and Design in Molecular Biology. By MICHAEL A. SAVAGEAU. Addison-Wesley Publishing Co., Reading, Mass. 1976. xvii + 379 pp. \$26.50.

Devoted to mathematical treatment of biochemical systems.

Electron Paramagnetic Resonance in Compounds of Transition Elements. By S. A. AL'TSHULER and B. M. KOZYREV. Halsted Press/John Wiley, New York. 1975. xii + 589 pp. \$63.50.

This book is a translation of a Russian original that was published in 1972. We apologize for the delay in reporting this book; there were unexpected difficulties in obtaining a usable review.

BOOKS ON GENERAL CHEMISTRY RECEIVED

Basic College Chemistry. By DON ROACH and EDMUND LEDDY, JR. (Miami-Dade Community College). McGraw-Hill Book Co., New York. 1979. xviii + 636 pp. \$16.95.

Elements of General and Biological Chemistry. An Introduction to the Molecular Basis of Life. Fifth Edition. By JOHN R. HOLUM (Augsburg College). John Wiley & Sons, Inc., New York. 1979. xiii + 571 pp. \$16.95.

Chemistry, Principles and Applications. By MICHELL J. SIENKO (Cornell University) and ROBERT A. PLANE (Clarkson College of Technology). McGraw-Hill Book Co., New York. 1979. x + 691 pp. \$19.00.

Inside Chemistry. By CHARLES COMPTON (Williams College). McGraw-Hill Book Co., New York. 1979. xix + 569 pp. \$16.95.

Phosphorus in the Environment: Its Chemistry and Biochemistry. Ciba Foundation Symposium No. 57 (new series). Elsevier/Excerpta Medica/North-Holland, Amsterdam. 1978. 320 pp. \$31.75.

This volume reports the proceedings of another in a distinguished series of symposia on various aspects of medical and chemical research held at the Ciba Foundation in London. As noted in the introduction by Professor R. J. P. Williams of Oxford University, this book chronicles an attempt by a diversified group of scientists to consider scientific and economic aspects of "the proper use of the world's phosphate resources." There are four papers which define the available resources of phosphorus and the dependence and influence of man on these resources, the economic and technical aspects of the use of phosphates, and the cycles of phosphorus in nature. Several papers consider inorganic and organic aspects of the reactions of phosphorus with emphasis on the importance of organophosphates in biology. Problems in plant cultivation which arise as a result of the deficiency of phosphate and difficulties in the disposal of sewage occasioned by an excess of phosphate are discussed by several authors. Finally, two papers touch on political aspects of phosphorus in the environment. From information on the back of the title page, it appears that the original title of this symposium indicated a focus on the economy and chemistry of phosphorus in the environment. This would have been a more appropriate title for the book since treatment of the biochemistry of phosphate is superficial and would not satisfy any reader drawn to the publication by a desire to gain a satisfactory understanding of the biochemical aspects of this topic. Nevertheless, the book provides a useful and readable overview of the role of phosphorus in the environment and the problems which exist in regard to the cycling of phosphorus in man's ecosystem. Probably because they represented different scientific disciplines, the participants appear to have successfully exerted considerable effort to keep the presentations and discussions intelligible to a broad spectrum of scientific "laymen" rather than to a small group of scientific experts.

I. A. Bernstein, *The University of Michigan*

Catalysis by Electron Donor-Acceptor Complexes: Their General Behavior and Biological Roles. By K. TAMARA (University of Tokyo) and M. ICHIKAWA (Sagami Chemical Research Center). Wiley/Halsted, New York. 1976. viii + 208 pp. \$19.00.

This book is an attempt "to review all relevant work on EDA complexes and to present it in a coherent manner." Against this backdrop, the book is ultimately directed toward a discussion of the role of EDA complexes in biological systems. Given these goals, the book is only partially successful and suffers most in (apparently) not reviewing current work, especially work relating to biological systems.

The book has five chapters: Introduction (8 pp; 12 refs, none from 1970 on); Formation of EDA Complexes (44 pp; 81 refs, 5 from 1970+); Homogeneous Catalysis by EDA Complexes (40 pp; 65 refs, 4 from 1970+); Heterogeneous Catalysis by EDA Complexes (66 pp; 78 refs, 22 from 1970+); and The Role of EDA Complexes in Biochemical Reactions (44 pp; 97 refs, none from 1970 on).

The authors' style and their presentation of data are generally clear, but often noncritical. Perhaps reflecting their own interests, the chapter on heterogeneous catalysis by EDA complexes is by far the strongest. This book should be useful to students and researchers interested in electron donor-acceptor complexes who desire to broaden their view of the field to include some, albeit dated, biological analogies.

James W. Long, *University of Oregon*

Strained Organic Molecules. By ARTHUR GREENBERG (New Jersey Institute of Technology) and JOEL F. LIEBMAN (University of Maryland—Baltimore County). Academic Press, New York. 1978. xi + 406 pp. \$41.50.

This book discusses the chemistry of strained organic molecules from a physical-organic point of view. It begins with some general remarks on molecular energy content, emphasizing the difficulty, associated principally with selecting appropriate reference substances, of assigning precise numerical values to molecular strain energy; this

section also discusses symmetry and zero-point energy. The book then moves on to a thorough-going review of the chemistry of cyclopropane and cyclobutane, and it follows that with discussion of other unique strain-conferring structural groups such as tetrahydrane, twisted alkenes, benzyne, etc. It then discusses a selected number of more complex molecules in which these unique structural elements occur, and it finishes with such rare species as planar methane and five- and six-coordinate carbon.

The authors of this book recently wrote a review on the same subject [*Chem. Rev.*, **76**, 311 (1976)]. The present book, however, is much more than just an updated reprint of that review; for example, the book contains twice as many references as the review. The writing of this book is good and to the point, and the book on the whole is relatively free of errors, although a few mistakes do stand out, e.g., an expression which gives a negative value to the entropy of mixing and a reference which claims the first synthesis of cyclooctyne occurred in 1973, a full twenty years late!

This book should prove to be a useful reference work for chemists doing research on strained organic molecules. It will also make good reading for many others who are simply interested in unusual molecules and why they do or do not exist.

A. J. Kresge, *University of Toronto, Scarborough College*

Chemistry—Reactions, Structure and Properties. Second Edition. By CLYDE R. DILLARD and DAVID E. GOLDBERG (Brooklyn College of the City University of New York). Macmillan Publishing Co. Inc., New York, and Collier Macmillan Publishers, London. 1978. xxii + 756 pp. \$16.95.

The subject of this text of general chemistry, although it is intended primarily for the science-oriented student, does not abandon those students whose backgrounds and interests may be less specific. The text is divided into four sections: Chapters 1–8 deal with stoichiometry and equilibrium, Chapters 9–14 with atomic and molecular structure, Chapters 15–18 with kinetics and the physical chemistry of matter in bulk, and Chapters 19–23 with selected topics of descriptive chemistry. The exercises at the end of each chapter are classified in order of difficulty as basic, general, and advanced, with the hope that the exercises in the last category will both challenge and stimulate the better prepared student.

The text is well organized and the figures are large and clear. The use of a second color for figures draw the attention of the reader to a particular feature of the illustration. Many of the concepts are presented as "tools"; that is, emphasis is placed on the application of principles rather than on more memorization of facts.

This text provides enough material for a basic course of general chemistry. It demonstrates a wide scope of chemistry not only for science-oriented students but also for those in the biological or medical fields.

Mohamed E. Nasr, *The University of Michigan*

Molecular Biology Biochemistry and Biophysics 27. Effects of Ionizing Radiation on DNA. Edited by J. HÜTTERMANN, W. KOHNLEIN, and R. TÉOULE. Coordinating Editor: A. J. BERTINCHAMPS. Commission of the European Communities, Bruxelles, Springer-Verlag, Berlin-Heidelberg-New York. 1978. xxii + 383 pp. \$43.00.

This volume presents the culmination of collaborative effort between specialists in the wide range of disciplines concerned with the effects of ionizing radiations on nucleic acids.

The first section ties together the physical aspects including structure and electronic properties of DNA, interaction of ionizing radiation with matter, structure of radicals from nucleic acid constituents, radical yields, radiomimetic radical production, and transfer phenomena.

The second section is devoted to the chemical aspects including primary events in the radiolysis of aqueous solutions of nucleic acids, radiation-induced degradation of the base and the sugar components in DNA, and changes in the secondary and tertiary structures of DNA after irradiation. The third section discusses the biological aspects including subjects such as biological functions of DNA and methods of testing, radiation effect on biological function, modification of radiation damage, repair processes for radiation-induced DNA damage, and molecular aspects of mutagenesis due to ionizing radiation.

The aim of the authors, as stated in the volume, to identify the interdependence and the interaction of the products, especially those

responsible for biological alterations and their radical precursors, has been only partially achieved. The volume, therefore, should be regarded only as an attempt, which perhaps deserves publicizing, and may stimulate a similar effort at integration on a broader scale.

In general, the volume is extremely useful for researchers in the field with easy access to sufficient up-to-date literature.

Mohamed E. Nasr, *The University of Michigan*

Emission Spectrochemical Analysis. By T. TÖRÖK (L. Eötvös University, Budapest), J. MIKA (Technical University, Miskolc), and E. GEGUS (Technical University, Veszprém). Adam Hilger, Bristol, U.K., and Crane, Russak & Co., New York. 1978. 692 pp. \$65.00.

Mika and Török are known by their 1973 book, "Analytical Emission Spectroscopy, Fundamentals". This more recent book deals with applied analysis, and is impressive by its size and intensive coverage. It achieves its goal of being a comprehensive treatise. Unlike several recent books on this subject in the United States, this one is written by three authors and is not a collection of monographs by a group of authors.

The European viewpoint is a welcomed balance to the American books. Apparently this book was written in English and is not a translation. An American editor would have eliminated some of the extreme wordiness and caught some misspellings of American authors' names. Citations predate 1974 with only a few exceptions, for which the authors apologize, and this reminds us that one must keep current in spectroscopy through spectroscopic conferences and journals.

The text consists of eight chapters covering practical methods of spectrochemical analysis by research workers and technicians in academic and industrial laboratories. After a brief introductory chapter, the subject of sample preparation is considered in the second chapter. This is followed by chapters on radiation sources and conditions affecting line intensities. The next three chapters deal with specifics of spectrographic analysis, spectrometric analysis, and visual spectroscopic analysis. The final chapter deals with the fundamentals and applications of error calculations.

The book also includes tables of some physico-chemical constants, wavelength tables, tables of homologous line pairs, numerical tables, and tables for visual spectroscopic analysis and for error calculations.

There is no author index, but numerous references are given throughout the book. The price of the book may be justified by its comprehensive nature, but may reduce its appeal. The book should be included as a reference in a laboratory library.

D. C. Spindler, *Ferro Corporation*

Quantum Theory of Polymers. By J.-M. ANDRÉ and J. DELHALLE (Facultés Universitaires de Namur), and J. LADIK (Universität Erlangen-Nürnberg). D. Reidel Publishing Co., Dordrecht, Holland. 1978. xi + 376 pp; 85 guilders.

This book consists of the 17 main lectures given at a NATO Advanced Study Institute held in Namur, Belgium, in the fall of 1977. The topics include SCF-LCAO crystal orbital theory, the evaluation of electron repulsion integrals, X-ray photoelectron spectroscopy, correlation energies in solids, excited electronic states, coupled cluster expansion techniques, Fourier representation methods, linked cluster perturbation theory, aperiodic or disordered chains, chemisorption onto polymers, hydrogen bonding, biopolymers (such as proteins and DNA), conducting polymers [such as (SN)_x], and the transport and mechanical properties of semiconductors. There is an author index, but no subject index.

The emphasis of the book is very heavily on methods currently being developed for the quantum mechanical treatment of polymers; apparently, relatively few actual calculations of properties have been carried out. Nonetheless, the book will certainly serve the purpose for which it and the NATO Institute were intended, namely, to provide a detailed report on the status of a particular area of research and to stimulate interest in its further development.

J. E. Mark, *University of Cincinnati*

The Determination of Sulphur-containing Groups. Volume 3. Analytical Methods for Sulphides and Disulphides. By M. R. F. ASHWORTH (University of The Saarland). Academic Press, Inc., London. 1977. xi + 220 pp. £11.00/\$21.50.

This book is a continuation of the two earlier volumes by M. R. F. Ashworth that describe analytical methods for the determination of sulfones, sulfoxides, sulfonyl halides, thiocyanates, isothiocyanates,

and isocyanates (Volume 1, 1972), and the determination of thiol groups (Volume 2, 1976). All three volumes are part of the International Series of Monographs, edited by R. Belcher and D. M. W. Anderson, on the topic of "The Analysis of Organic Materials". As in Volume 2 by Ashworth, full experimental details of the analytical methods are not given. "As far as possible, the literature has been covered up to the end of 1975."

There are approximately equal pages of the book devoted to the two parts, Sulphides and Disulphides. Each part is organized along the same lines with the use of chemical reagents or reactions or the techniques such as spectroscopy or chromatography serving as the major chapter headings. Chemical methods for the determination of sulfides are found in four chapters involving oxidation to higher sulfur valencies, formation of sulfonium salts or complexes with metal salts, fission of C-S bonds, and miscellaneous reactions. The chemical methods for disulfides are presented in three chapters that discuss conversion to thiols or thiolates by procedures of reduction, fission with certain anions, or equilibrium reactions, plus one chapter describing methods of oxidation to sulfur(VI) and one chapter describing miscellaneous chemical procedures. There is also found in each part a very brief chapter on microbiological methods. Each of the chemical method chapters is subdivided under the various reagents used, arranged alphabetically.

The format and organization of the book stresses its reference and summary character. There are many tables throughout the chapters that provide for summaries and/or a convenient comparison of many of the various reactions and methods described. The references in each section are given by author name and year. The methods and procedures presented for both detection and quantitative determination are extremely brief in detail and the original literature would need to be consulted in most cases to get complete experimental information. The book is a well-organized compendium. The author index (18 pp) is a nice addition. Although the subject index is quite brief (6 pp), it appears reasonably complete. Interestingly enough, this reviewer found the Table of Contents (also 6 pp) as valuable as the subject index in locating specific methods and techniques. The world's literature has been adequately covered in preparing the material for inclusion in the book.

This book will serve as a valuable addition to libraries as a reference source book for specific methods for organic sulfides and disulfides.

James M. Pappenhagen, *Kenyon College*

Molecular Interactions and Activity in Proteins. *Ciba Foundation Symposium No. 60* (new series). Excerpta Medica, Amsterdam, 1978. viii + 279 pp. \$28.50.

This volume is the proceedings of a symposium held at the Ciba Foundation, London, Dec 6-7, 1977. The 13 papers delivered at the symposium (plus a 14th by L. A. Blumenfeld, Academy of Sciences of the USSR, who was unable to attend) span a considerable range of theoretical, physical, and organic chemical approaches to problems of protein structure and function. Examples of the topics covered are included in papers by W. N. Lipscomb, on the dissection into several definable components of the rate enhancements observed in enzyme-catalyzed reactions and some of the small molecule model systems which have been used to probe the contributions to the overall rate enhancements of individual components; by F. M. Richards and T. Richmond, on a theoretical approach to the stabilization energetics of protein secondary and tertiary structure; by D. C. Phillips, R. J. P. Williams, et al., on a comparison of the structure of egg white lysozyme in the crystalline state and in solution, as determined by X-ray crystallography and NMR spectroscopy, respectively; by T. L. Blundell et al., on structural aspects of hormone-receptor interactions, with reference to insulin and related molecules and to glucagon; and by J. Boger and J. R. Knowles, on the construction of a synzyme, based on α -cyclodextrin, designed to stabilize the transition state for the in-line displacement of a phosphate monoester.

A great strength of this volume is that it includes transcripts of the lively and probing discussions which followed each paper, as well as a transcript of the general discussion at the end of the symposium. From these discussions, it is clear that important contributions to the symposium were made by participants who did not give papers, e.g., interpretation of high resolution structural data obtained by two-dimensional *J*-resolved 360-MHz ^1H NMR of basic pancreatic trypsin inhibitor and of glucagon, discussed by K. Wüthrich.

Overall, the symposium covered a broad range of approaches to

protein structure-function relationships. The advantages, in terms of open discussion, of a small, well-organized symposium are shared with the reader. This volume should enjoy an avid readership among structural protein chemists and a broad readership among enzymologists, organic chemists with an interest in the mechanisms of biochemical reactions, and others.

James V. Staros, *Vanderbilt University*

First International Congress on Phosphorus Compounds, Proceedings. By Institut Mondial du Phosphate (Imphos), 8, rue de Penthièvre, Paris 75008. 1978. xviii + 767 pp.

This volume is a compilation of papers presented before the first international congress of the World Phosphate Rock Institute, an organization devoted to the promotion of phosphate rock and of all the many uses and compounds which are derived from it. To those not familiar with all aspects of phosphorus chemistry, a glance at the contents of this volume should convince the reader of the diversity of the subject. The work begins with a number of introductory speeches, the most noteworthy being a presentation by Arthur D. F. Toy entitled, "Phosphorus Chemistry in Everyday Living", an excellent review of the present state of technology of phosphorus compounds important to our everyday living. Technical papers are divided into themes, no easy task since the conference covered a broad range of subject matters.

Theme I covers the general aspects of phosphorus chemistry and in reality is a collection of papers which do not easily fit into one of the more precise categories. The eight papers cover such diverse areas as computer design of synthesis to a compilation of instrumental techniques, particularly ^{31}P NMR. As is true throughout the proceedings, papers are about equally divided between French and English with the abstract given in the opposite language. Curiously, the first paper in this category, "International and Interdisciplinary Research Collaboration in Phosphorus Chemistry", is mistitled. Instead of a review of research collaboration, expected from the title, the paper is primarily a worthwhile resumé of the very fine work of the author, R. A. Shaw.

"Phosphorus in Biology", "Detergents and Water Treatment", make up Themes II and III, respectively. "Fire Control and Fire-Fighting Phosphorus Compounds" comprises Theme IV. Although the phosphazine and other cyclic compounds are included in this section, a separate category could have been devoted to this important area of phosphorus chemistry. A few papers suffer for not having a bibliography, a shortcoming which is not typical of the volume. "Phosphorus as an Apatite", "Phosphorus in Feeding", "Phosphorus Compounds in Chemotherapy", "Phosphorus Compounds in Organic Synthesis and in Catalysis", "Phosphorus Compounds in Plant Protection and Control" and "Phosphorus Compounds in Metal Surface Treatment and in Various Industrial Applications" complete the technical aspects of the volume.

The book is recommended for all chemists, both industrial and academic, interested in any applications of phosphorus chemistry. While it does not, nor is it intended, to replace other more specialized series, the book does put the reader abreast of current research in all areas of phosphorus chemistry. If there is a weakness, it perhaps lies in the inclusion of welcoming and inaugural addresses which are superfluous. Perhaps they will not be included in proceedings of future international conferences.

William S. Wadsworth, *South Dakota State University*

Physicochemical Aspects of Protein Denaturation. By SAVO LAPANJE (University of Ljubljana, Yugoslavia). John Wiley & Sons, Inc., New York. 1978. x + 331 pp. \$27.50.

For the past several decades, many physical chemists have attempted to unravel the mysteries surrounding structures, stabilities, and activities of proteins in their native states. A major leitmotif in this endeavor has been the concept of "denaturation", whereby protein structural changes are brought about by temperature or pressure changes, addition of organic solutes or solvents, or other major modifications of the already-complex aqueous protein solution. This monograph by Lapanje summarizes recent contributions to this field in the context of major findings of earlier interest. The author has done a scholarly job of assembling, analyzing, and organizing the more pertinent information. Following an introductory chapter dealing with basic ideas and terminology, there is a good discussion of the optical and other physical methods used to monitor conformational changes. Chapter Three contains the bulk of experimental results, classed ac-

ording to type of denaturing condition or agent used. Chapters Four and Five attempt to erect a respectable mathematical scaffolding for the thermodynamic and kinetic treatments of denaturation, and the final chapter is an exploration of the possible mechanisms of denaturation. There is an extensive list of references at the end.

In 1964, J. R. Colvin suggested that the term "denaturation" had outlived its usefulness, that it might be replaced by more precise operational terms. Obviously, his suggestion has not gained wide appeal. However, there are two other objections which seem more substantive at this point. One is that attention seems to have focussed excessively on the process and methodology itself, rather than on the goal of learning more about native protein structures. Another is that the diverse physical methods employed to monitor protein conformational shifts are rather shadowy reflections of these events, differing in sensitivity and bias toward one or another structural feature. Thus, even the most prepared and sympathetic reader may well lose track of the goal amidst so many experimental findings and qualifications. He will also realize that there is often an appreciable gap between the actual observations and the structural deductions. Moreover, although the author has made a commendable effort to emerge with certain generalizations about denaturation processes, it is surely evident that individual proteins show enormous variability of response.

Nonetheless, this book is well done and should have a wide appeal. Polymer chemists will be gratified by the growing fusion of protein chemistry concepts with those of synthetic polymer chemistry, and the organic chemists can have a "field day" with the many types of reactive functional groups in proteins. Of course, one ought to bear in mind that there are vast differences in complexity between even the simplest protein dissolved in water and synthetic polymer solutions; these complexities only deepen as other solutes and solvents are added. Proteins are, first and foremost, agents of biological function; challenging as it is to cope with their behavior as polymers, the more formidable but significant task is to grasp their structural-functional relationships. Indeed, some of the most spectacular advances (e.g., by Monod and Anfinsen) have been made by pursuing that task. The reader will have to judge for himself whether the voluminous residual information is leading anywhere worthwhile.

Samuel E. Allerton, *School of Dentistry
University of Southern California*

Fluoridation: The Great Dilemma. By GEORGE L. WALDBOTT, in collaboration with ALBERT W. BURGSTÄHLER (University of Kansas) and H. LEWIS MCKINNEY (University of Kansas). Coronado Press, Inc., Lawrence, Kansas. 1978. xxviii + 423 pp. \$14.95, hardcover; \$7.50, paperback.

Can the treatment of all consumers of fluoridated community water supplies be used to improve general dental health without causing other serious health problems? Dr. Waldbott, an allergist who has devoted his career to intensive research and study of this dilemma, and his collaborators present a scholarly, comprehensive, and meticulously documented discussion of the pros and cons. Fluoridation, at first seemingly simple and humane, has turned out to be so controversial, inflamed by emotion, and beclouded by a vast outpouring of propaganda that it is difficult to sort out well-established facts from the flood of dubious dogmatic statements. This book affords a good opportunity for each interested and fair-minded reader to reach an informed position.

The successes of the earlier massive programs to improve general public health by requiring pasteurization, chlorination of water supplies, and immunization techniques would seem to be good precedents for fluoridation. But the authors point out that these programs involve control of contagious diseases which endanger everyone, whereas fluoridation attempts to improve the dental health of individual children by exposing all consumers to possible ill effects.

The chemistry of fluorides is reviewed, with emphasis on the uniquely high activity of the small fluoride ion. All chemists are aware of the hazards encountered with fluorides and will appreciate the many ways in which even low but accumulative concentrations may affect our complicated body functions, especially since some important body enzymes are very sensitive to minute amounts of fluoride. Much remains to be learned by strictly controlled and long-time research before the advantages, disadvantages, and limitations of fluoridation become clear.

The authors suggest that the difficulties of controlling the dosage of fluoride provided to each child are great. While careful addition of fluoride at the water treatment plant may achieve a concentration within the narrow range recommended as effective and safe, the possibility of alteration during circulation to individual household taps exists. Also, will each child drink the prescribed quart of water per day? The great expansion of commercial application of fluorides since fluoridation was first suggested some forty years ago has increased the exposure of every one. Our air, water, and foods now contain varying amounts of fluoride, which make controlled mass dosage impossible.

Dr. Waldbott reviews the many ways in which fluorides may lead to health hazards, especially among adults whose teeth do not benefit. Not only is fluoride absorbed by teeth, but bones and soft vital tissues are observed to accumulate fluoride. Because individual reactions and situations may vary greatly, individual fluoride treatment with careful monitoring for ill effects would seem necessary. According to the authors, alternate ways of administering fluoride to children are now practiced and are reported to give good results if carefully controlled. Proper nutrition and good dental hygiene provide the best preventive measures.

Of interest is the well-documented survey of the massive and often dubious efforts that have been and are being made to get public acceptance of fluoridation. The many important industries that have been plagued with the disposal of fluoride wastes have given much support to fluoridation as a means of converting a disastrous problem to a profitable enterprise. The sugar industry welcomes fluoridation to counteract the ills of a high sugar diet. Harassment of opponents of fluoridation, suppression of adverse evidence, dubious endorsements, and constant reiteration of "not debatable issue" and "completely safe" are among the tactics reported.

Dr. Waldbott and his collaborators have rendered a great service by presenting this comprehensive study of the fluoridation dilemma.

A. W. Laubengayer, *Cornell University*

Leo Szilard: His Version of the Facts. Selected Recollections and Correspondence. Edited by SPENCER R. WEART (American Institute of Physics) and GERTRUD WEISS SZILARD (University of California, San Diego). The MIT Press, Cambridge, Mass. 1978. xxii + 244 pp. \$40.00.

This very welcome book presents Szilard's views on life, including particularly ideas and events related to the development and applications of nuclear chain reactions. The presentation consists of his own recollections taken mainly from tape recordings made in 1956, 1960, and 1963 and supported by a series of 122 documents selected largely from his correspondence related to nuclear reactions from 1933 through 1945.

The subtitle suggests some polemic flavor in view of other published accounts of the nuclear field in the early 1940s, but there is here no trace of looking back with rationalizations and ascribing of motives. It is refreshing to find the original relevant documents of one of the chief contributors and to be able to sense the spirit of the time without the aid (?) of an interpreter.

The material is divided into seven chapters. The first starts with his childhood but quickly reaches the time of his decision to study nuclear physics in 1932. He began thinking about nuclear chain reactions in September 1933 and in a few months had applied in England for a patent describing the laws governing these reactions. The chapter closes at the end of 1938 and his decision to stay in America.

The remaining chapters trace his experience and thinking through the early experiments with sustained chain reactions, the necessity of weapons development, the problems of maintaining an effective organized effort, the questions of the future of nuclear weapons, and the responsibilities of scientists. Among the highlights are the letters in Chapter III depicting the approach to Einstein and President Roosevelt, the memorandum in Chapter IV (Doc. 95) describing his concerns in September 1942, his recollections in Chapter VI of questioning the ultimate effectiveness of the actual use of the bomb, and finally his hope of bringing it under international control.

For this new uncovering of documents showing the beginnings of both atomic research and policy, the book is welcome.

L. O. Brockway, *University of Michigan*