
 BOOK REVIEWS

Progress in the Chemistry of Organic Natural Products ("Fortschritte der Chemie organischer Naturstoffe"). Fifth Volume. L. ZECHMEISTER, Editor, California Institute of Technology, Pasadena, California. Springer, Verlag, Vienna, Austria, 1948. viii + 417 pp. Illustrated. 16 × 24 cm. Price, \$11.20 unbound; \$12.00 bound.

The chapter content of Volume V of this series follows: I, Carotinoid-epoxyde und furanoide Oxyde von Carotinoidfarbstoffen, by P. Karrer; II, Some Biochemical Aspects of Marine Carotenoids, by D. L. Fox; III, Azulenes, by A. J. Haagen-Smit; IV, Recent Advances in the Study of Component Acids and Component Glycerides of Natural Fats, by T. P. Hilditch; V, Enzymatically Synthesized Polysaccharides and Disaccharides, by W. Z. Hassid and M. Dondoroff; VI, Recent Developments in the Structural Problem of Cellulose, by E. Pacsu; VII, Lignin, by F. E. Brauns; VIII, The Chemistry of the Constituents of Toad Venoms, by V. Deulofeu; IX, Biochemistry of Fish Poisons, by E. Geiger; X, Some Recent Developments in Chemical Genetics, by G. W. Beadle; XI, Infrared Spectroscopy in Structure Determination and its Application to Penicillin, by R. S. Rasmussen.

The authors are all distinguished scientists with a background of experience in the subjects on which they have written. In each of the chapters the latest important material until the time of preparation of manuscripts (presumably 1947) has been assembled. The presentations are designed primarily for research men who desire a resumé of the topics covered and references to the pertinent literature. The chapters are clearly written, cover the expected ground, and adequately fulfill the objective of the volume. In these days when the chemical literature has become so voluminous, books of this kind are particularly welcome to the investigator. This volume is a reference work that can be highly recommended to those whose interest lies in organic natural products.

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ROGER ADAMS

Heterocyclic Compounds. Volume I. Edited by ROBERT C. ELDERFIELD, Columbia University. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1950. vii + 703 pp. 15.5 × 23 cm. Price, \$11.00.

There has long been an obvious need for a good reference work covering the field of heterocycles, and the series of volumes, of which the present book is the first, represents an outstanding attempt to fill this need. Undoubtedly this series is one which should be available in every good chemical library and which the practising organic chemist will find highly useful.

The style of the series is that of a symposium with authors contributing chapters on their specialties under the editorship of Professor Elderfield. The topics covered in the first volume are as follows: "Ethylene and Trimethylene Oxides" by S. Winstein and R. B. Henderson; "Ethylenimine" by J. S. Fruton; "Derivatives of Azete" by S. A. Ballard and D. S. Melstrom; "Furan" by R. C. Elderfield and T. N. Dodd, Jr.; "Thiophene" by F. F. Blicke; "Pyrrole and Its Derivatives" by A. H. Corwin; "Pyrans, Pyrones, Thiapyrans, and Thiapyrones" by J. Fried; "Pyridines" by H. S. Mosher; and "Piperidines and Hydrogenated Pyridines" by H. S. Mosher.

The stated objective of the book is to present the "chemical principles dealing with the syntheses, properties, and reactions" of the heterocycles compounds. In order to present the essential chemistry as clearly and briefly as possible, no tabulation of physical properties has been made nor is there any detailed treatment of alkaloids or other natural products. Although references to the literature are given, no claim is made to an exhaustive literature coverage. Thus, the book may serve as a starting point for a detailed literature search, but its essential purpose is to present a survey of heterocyclic reactions.

For the most part the authors have done an excellent job in attaining their objectives. The book is well organized and well written. With one possible exception, the literature has been extensively covered through 1947 and a few references to even later work are included. In view of the editorial aim of avoiding flights of theoretical speculation, the interpretation of reaction mechanisms has been done mainly by citing the opinions of the various investigators. The reviewer found that those sections, in which original or critical interpretations of data were made, were quite stimulating and wished that this had been done more extensively in the case of the aromatic heterocycles.

The excellent quality of this initial volume augurs well for the success of the series and it is hoped that further volumes will be available in the near future.

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Bulletin of the National Research Council. Number 118, June 1949. Data on Chemicals for Ceramic Use. Based on Report of the Committee on Chemical Data for Ceramists, Division of Chemistry and Chemical Technology, National Research Council. ALEXANDER SILVERMAN, Chairman, University of Pittsburgh, HERBERT INSLEY, GEORGE W. MOREY and FREDERICK D. ROSSINI. Published by the University of Pittsburgh for the National Research Council, National Academy of Sciences. Washington, D. C. 1950. xi + 193 pp. 15 × 23 cm. Price, \$5.00.

This work is a revision and elaboration of National Research Council Bulletin No. 107 (June, 1943). It lists formulas, molecular weights, densities, transition points, melting points, boiling points, sublimation points, decomposition temperatures, refractive indices, crystal forms, colors, and identifying X-ray powder-diffraction lines for the chemical elements and principal inorganic compounds. Data are revised to include new values available through May 1949. About 1000 new substances have been added, making a total listing of some 3400 substances.

Inclusion in the present volume of identifying X-ray powder-diffraction lines (*i.e.*, the three strongest lines as in the A.S.T.M. index) is a useful improvement. Other noteworthy additions are the extensive coverage of organo-silicon compounds and data for the transuranic elements and compounds.

This compilation is superior to tables in most handbooks in that the data are more critically selected and references are given to the original sources. One should not be misled by the too restrictive phrase "for ceramic use" appearing in the title. The reviewer recommends it unreservedly to chemists, physicists and mineralogists, especially to those concerned with the preparation, identification and testing of inorganic substances, either synthetic or naturally occurring.

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Physico-Chemical Constants of Pure Organic Compounds. By J. TIMMERMANS, Professor of Physical Chemistry, Université Libre, Brussels; Director of the International Bureau of Physico-Chemical Standards. Elsevier Publishing Company, Inc., 250 Fifth Avenue, New York 1, N. Y., 1950. viii + 693 pp. 17.5 × 24.5 cm. Price, \$12.50.

According to the author, this book "records, as completely as possible, those physico-chemical constants of organic compounds which have been measured with sufficient care to warrant their acceptance as data established with a precision worthy of contemporary science."

Compilations of physical properties are given for hydrocarbons (191 pages), halogenated derivatives (92 pages),

oxygenated derivatives of the aliphatic series (155 pages), oxygenated derivatives of the aromatic series (32 pages), oxygenated derivatives of polymethylenes (10 pages), heterocyclic oxygen compounds (5 pages), sugars (2 pages), mixed oxyhalogenated derivatives (11 pages), nitrogen derivatives of the aliphatic series (34 pages), nitrogen derivatives of the cyclic series (26 pages), oxy-nitrogen derivatives (25 pages), mixed halogenated nitrogen derivatives (8 pages), sulfur derivatives (15 pages), and derivatives with other elements (3 pages). A bibliography containing a short historical section together with a 27-page reference section is included. Altogether more than 1500 organic compounds are listed but for some of these no properties are recorded, the reader being referred in these cases to the original literature.

For each property of each compound there is usually recorded, when available, several values which the author has chosen as the most reliable in the literature. No attempt is made to select a single "best" value. Thus, for example, for the boiling point of *n*-hexane, sixteen values, ranging from 68.6° to 68.95°C., are given.

With regard to the section on hydrocarbons, coverage of the recent literature is incomplete and does not justify the author's prefatory statement that the results include "those provided by a systematic harvesting of the whole chemical literature up to January 1, 1950." In this regard it is unfortunate that two important papers (Forziati, Norris, and Rossini, *J. Research Natl. Bur. Standards*, **43**, 555 (1949) and Forziati and Rossini, *ibid.*, **43**, 473 (1949)) came to the author's attention too late for inclusion. Another paper (Forziati, Glasgow, Willingham and Rossini, *ibid.*, **36**, 129 (1946)), which gives values for the boiling point, pressure coefficient of the boiling point, refractive index, density and freezing point for 51 hydrocarbons, has been very incompletely abstracted. Among other papers which are incompletely abstracted are the following: Streiff, Murphy, Sedlak, Willingham and Rossini, *ibid.*, **37**, 331 (1946); Streiff, Murphy, Cahill, Flanagan, Sedlak, Willingham and Rossini, *ibid.*, **38**, 53 (1947); Streiff, Murphy, Zimmerman, Soule, Sedlak, Willingham and Rozzini, *ibid.*, **39**, 321 (1947); and Streiff, Zimmerman, Soule, Butt, Sedlak, Willingham and Rossini, *ibid.*, **41**, 323 (1948). These four papers record values for the freezing points of 103 hydrocarbons of high purity; yet, values from these papers have been recorded in this book for only 25 compounds, while for an additional six the reference is given. The statement made on page 633 with regard to the "Selected Values of Properties of Hydrocarbons" prepared by the American Petroleum Institute Research Project 44, namely, "We could not always take into account these numerical data, as they were abstracted from unpublished work of unknown accuracy" is incorrect. In the "Selected Values of Properties of Hydrocarbons" the sources of data are given specifically for each property of each compound, in Section IV on Specific References for Tables of Properties.

Several inconsistencies and errors have been noted in the section on hydrocarbons. In a number of cases the original references give values both for the freezing point of the actual sample and for the freezing point for zero impurity. The author, in recording values from these references, has sometimes selected one value and sometimes the other, whereas the correct procedure is to select, wherever possible, the value for zero impurity. Values given by Todd, Oliver and Huffman, *THIS JOURNAL*, **69**, 1519 (1947), for triple points are recorded as melting points though there may be significant differences between these two quantities. The value recorded for the melting point of 1-pentene (-166.222°), attributed to Todd, Oliver and Huffman, is in error. Actually, these authors state that there was something unusual about the behavior of the sample they used and do not give a value for the triple point. They do, however, give the value -165.222° for their sample at 89.6% melted. Some of the properties of the *cis*- and *trans*-isomers of 1,3-dimethylcyclohexane are given incorrectly. In this case the *cis* is the lower boiling and the *trans* the higher boiling isomer (see Rossini and Pitzer, *Science*, **105**, 647 (1947)). For both the *cis* and *trans* isomers the freezing points are given correctly but the other properties of each isomer are interchanged.

Those who are primarily concerned with hydrocarbons will not find in this book a satisfactory substitute for the "Selected Values of Properties of Hydrocarbons" pre-

pared by the American Petroleum Institute Research Project 44. However, for those interested in organic non-hydrocarbon compounds, where other comprehensive compilations are not available, this book will serve a useful purpose.

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Colloid Science. By JAMES W. MCBAIN, Director, National Chemical Laboratories, Poona, India, formerly Professor of Chemistry, Stanford University. D. C. Heath and Company, 285 Columbus Avenue, Boston 16, Massachusetts, 1950. xiv + 450 pp. 16 × 24 cm. The Text Edition is published by D. C. Heath and Company, list price \$6.00. The Trade Edition is distributed (except in the British Commonwealth) by Reinhold Publishing Corporation, price \$8.00.

During the past quarter century there has been a pronounced shift of emphasis from the inorganic, largely accidental, colloids to the organic or intrinsic colloids. Because of the importance of the intrinsic, macromolecular colloids to industry and to biology and medicine it was to be expected that new instruments and new methods of investigation would be developed, so that what is termed Colloid Science in 1950 is quite different from the classical subject. It is a tribute to the author's judgment, ability and ease of expression that he has compressed so much of the new subject, along with more classical material, into such a readable volume.

Traditionally, Colloid Science is a diversified subject. One may take the position that it is a section of physical chemistry which merges gradually but ever more completely with the several other sections, or one may believe that superimposed on the general laws of physics and chemistry there are further disciplines of colloid science. Professor McBain has adopted the second premise for his treatment of the subject.

The material is presented in twenty-seven chapters, the first being an introduction and the last a description of aerosols. Chapter topics are distributed according to the general plan of development of the theoretical subject and of methods followed by the application to specific systems such as soaps, proteins, polysaccharides, natural and synthetic high polymers, clays, etc. Many of the chapters contain a useful list of general references along with the usual text references.

The task of the Reviewer is made somewhat difficult because there is no statement in the preface to indicate to whom the book is addressed. It is a descriptive treatment with relatively few mathematical equations, one which is clear, refreshing and provocative of thought. Perhaps one ought to add the work is so well done that there is an element of deception in that there is more available than that which first meets the eye. In any event it is fair to say that the subjects are introduced but not really developed and we shall assume the volume is intended as an undergraduate text, perhaps at the senior level.

Professor McBain's numerous scientific contributions to Colloid Chemistry have brought him to a personal familiarity with many of the subjects treated. It is the exceptional chapter which contains no reference to him or to his school. The author is at his best in presenting the material on emulsions and foams, on sorption and on the soaps and other colloidal electrolytes. Here one finds many interesting and effective discussions based upon the best available information. These are his favorite subjects. Unfortunately, one cannot escape the feeling that the same success has not attended some of his statements in those sections where certain of the molecular kinetic properties are under consideration. Here one suspects that on occasion opinion may have taken the place of fact with the result that an unbalanced description appears.

It is a very attractive book with fine binding, clear printing, excellent diagrams and outstanding indices. It should be useful to anybody who wishes to achieve a first and general insight into the colloid chemistry of today.

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The Physical Chemistry of Electrolytic Solutions. New 2nd Edition. American Chemical Society Monograph No. 95. By HERBERT S. HARNED, Professor of Chemistry, Yale University, and BENTON B. OWEN, Professor of Chemistry, Yale University. Reinhold Publishing Corporation, 330 W. 42nd Street, New York 18, N. Y., 1950. xxxvi + 645 pp. Price, \$10.00.

The first edition of this treatise has been a book of great value. Its critical discussions, voluminous tables and extensive bibliography have become indispensable to investigators dealing directly with researches on the behavior and constitution of electrolytic solutions. Well arranged and carefully indexed, it is also an invaluable reference work for scientists in other fields.

Since printing costs forbade a complete revision of "The Physical Chemistry of Electrolytic Solutions," a less expensive procedure was adopted. The principal difference between the first and second editions is Appendix B which consists of thirty-seven pages added at the back of the book. The new appendix contains a separate Author Index, eleven sections and a Table of Contents detailing the subjects of each of the sections. The older and new portions of the book have been carefully integrated. The new pages, tables, and even some of the new figures are accompanied by notes directing the reader to the older chapters, tables and figures which must be consulted for a profitable reading of Appendix B. In addition, numerous references have been inserted in the older portions of the book to inform readers of additional discussions in the Appendix. A reader seeking complete information on any one subject included in the first edition may rely on the subject index, therefore, to guide him to pertinent material wherever it occurs.

The method for providing a new edition is fairly satisfactory. It has at least two serious drawbacks, however. The rewriting of sections or long paragraphs concerning which the authors' views may have changed was not possible. Typographical errors were corrected, however, and the general quality and beauty of the book has been appreciably improved, thereby. A more serious fault, probably, is the omission from the subject index of topics treated in Appendix B for the first time. Readers not well acquainted with the book and consulting it in a library may fail even in a careful examination of the index to find any trace of those subjects. The reviewer recommends that indexes of books revised in accordance with the plan followed by the publishers of this volume carry on each page a note calling attention to the Table of Contents of the newly added portions of the book. A similar note might be included in the main author index, but, unless that index be unusually lengthy, it should be combined with the newer author index. Reduction of the likelihood of a reader's missing an important reference is too important to be ignored.

Three pages of Appendix B are devoted largely to tables and empirical equations of interest only to specialists. They include a table of fundamental constants, somewhat newer and "more probable" than a similar one in the first edition, and a revised table of coefficients to be used in various theoretical calculations. Most of the changes are small and of no significance for most purposes. The newer values must be available for treatment of the results of some new researches, however, and their tabulation along with certain functions not included in the older tables is an essential part of the new book.

The contents of the other sections are of interest to a much wider audience. These include a number of subjects toward which major attention has been directed during the past five to ten years. There have been new developments in the theory, use and experimental determination of ionic mobilities. Recent progress in the measurement and interpretation of differential diffusion coefficients has been remarkable, and is of importance to both physical and biological scientists. New methods for the extrapolation of apparent molal properties to infinite dilution are resulting in better knowledge concerning their variations and per-

mitting important new tests of theory. There have been significant additions to knowledge of activity coefficients, and new contributions to the theories of electrostatic forces and of ionic hydration. Of widest interest, perhaps, are the recent studies made by Stokes and Robinson of the hydration of ions. Whether their views prove to be right or wrong, they deserve and will receive much attention. There have been important new contributions to the study of equilibria within electrolytic solutions, especially of the dissociation of strong electrolytes, including intermediate ions such as HSO_4^- and PbCl^+ . It is to be hoped that the clear, brief and conveniently accessible discussions of Harned and Owen will exert corrective influences on some of those writers of elementary text books who have persisted in misinterpreting the Debye-Hückel and Onsager theories as "one-hundred-per-cent-dissociation theories," when there is abundant experimental evidence—in accord with those theories—of incomplete dissociation. One section is devoted to the effects of "solvent" salts on equilibria and findings concerning the constitution of aqueous solutions of CO_2 (and H_2CO_3). The eleventh section contains a brief introduction to complex aggregates of ions and polymer electrolytes, a relatively new and rapidly advancing addition to the field of solutions.

Space devoted to each subject is necessarily small but typical results, key facts, and broad generalizations enable the reader to comprehend the range of subjects being covered by current researches. The extensive references will facilitate further study of each subject. The new Appendix B should make it clear to those who were not aware of it, that the past decade has been one of the most fruitful in the development of the physical chemistry of solutions. With the aid of new tools recently developed, and of the new basic knowledge which has accumulated, and under the catalytic influence of this book, the understanding of solutions should advance even more rapidly during the next ten years.

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BOOKS RECEIVED

December 10, 1950–January 10, 1951

- ANTHONY A. ALBANESE (edited by). "Protein and Amino Acid Requirements of Mammals." Academic Press, Inc., Publishers, 125 East 23rd Street, New York 10, N. Y. 1950. 155 pp. \$4.00.
- ROBERT C. ELDERFIELD (edited by). "Heterocyclic Compounds." Volume II. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1951. 571 pp. \$15.00.
- FRANZ HEIN. "Chemische Koordinationslehre." S. Hirzel Verlag, Claridenhof, Gotthardstrasse 6, Zürich 2, Switzerland. 1950. 683 pp. Fr. 44.—
- FREDERICK LEONARD AND CHARLES P. HUTTRER. "Histamine Antagonists." Chemical-Biological Coordination Center Review No. 3. National Research Council, Washington, D. C. 1950. 122 pp. \$1.50.
- R. W. B. PEARSE AND A. G. GAYDON. "The Identification of Molecular Spectra." Second Edition Revised. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1950. 276 pp. \$8.50.
- JAMES B. SUMNER AND KARL MYRBÄCK (edited by). "The Enzymes. Chemistry and Mechanism of Action." Volume I, Part 1. Academic Press, Inc., Publishers, 125 East 23rd Street, New York 10, N. Y. 1950. 724 pp. \$13.50.