
 BOOK REVIEWS

Elsevier's Encyclopaedia of Organic Chemistry. Series III. Carboisocyclic Condensed Compounds. Volume 12 B. Naphthalene Oxo-compounds except Quinones. Edited by F. RADT. Elsevier Book Company, Inc., 250 Fifth Avenue, New York 1, N. Y. 1950. xxxv + 2189-2716 pp. 18 × 26 cm. Price: A, For subscribers to the complete work, \$37.50; B, For subscribers to Series III, \$43.75; C, For single volume, \$50.00.

Seven volumes of this now well-known series have appeared. This particular book should be of especial interest to chemists whose work deals with steroids and terpenes, since many of the important synthetic intermediates are to be found here.

As with the previous volumes, a detailed and well organized Contents, General Survey, Table of Abbreviations, Table of Periodicals, Subject Index and Formula Index are included. All of these appear to have been compiled with great care and thoroughness. Copious references follow each section immediately upon completion of the descriptive matter. According to the editor, the subject matter covers up through December 31, 1944; but publications relating to the structures of compounds are considered right up to the date of printing (*i.e.*, 1950). Obviously an honest attempt has been made to fulfil this promise.

The reviewer has been delighted with all of the volumes of "Elsevier's Encyclopaedia" which have been published thus far. Adequate room has been given to the carefully printed structural formulas and compound titles. The format makes for unusually convenient reading, and, thanks to the Publisher, the book is generally well constructed and made of first class materials throughout.

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RICHARD T. ARNOLD

The Acridines. Their Preparation, Physical, Chemical and Biological Properties and Uses. By ADRIEN ALBERT, D.Sc. (London); Ph.D. Medicine (London); B.Sc. (Sydney); F.R.I.C., Professor of Medical Chemistry, The Australian National University, Canberra, and Honorary Lecturer in the Biochemistry Department, University College, London. Formerly Director of Chemotherapy Group and Post-Graduate Lecturer in Medical Chemistry, The University of Sydney. Longmans, Green and Co., Inc., 55 Fifth Avenue, New York, N. Y., 1951. xiii + 381 pp. 19.5 × 25.5 cm. Price, \$14.00.

This book the first to be devoted exclusively to the chemistry of acridine and its derivatives, is a scholarly contribution to the literature of organic chemistry, and, as such, will appeal generally to organic chemists. Its interest, however, goes well beyond this limited field because it also includes an excellent treatment of the fascinating correlations of structure with physical and chemical properties, biological activity and also with practical applications to the industry and art of dyeing. To the writing of this review the author brings an appreciation of and a regard for the subject growing out of the labors of twenty years. The resulting book is eloquent testimony of the remarkable extensiveness and intensiveness of that inquiry.

The book is divided into four main parts. Part one is a section of ninety-eight pages and eight chapters devoted in general to a discussion of preparative methods of use in the synthesis of acridines and acridine precursors. Several chapter headings which convey the type of treatment are, "The Preparation of Diphenylamine-2-carboxylic Acids" and "Synthesis of Acridines from Diphenylamines and Organic Acids." The author has gone to considerable length to provide the reader with as complete a survey of preparative procedures as possible. Not only are explicit laboratory instructions given but the section is replete with tables listing conditions, yields, references and starting compounds for a great variety and number of acridines. Part two, a

section of eight chapters and one hundred sixteen pages, is entitled, "Physical and Chemical Properties." Herein the author presents partly in the form of annotated tables a vast amount of observation of physical and chemical properties. Of perhaps greater significance and use, however, are the deductions and conclusions suggested by the author from a consideration of the data.

Part three comprising four chapters and seventy pages treats the application of acridine compounds to biological systems. In this section the author discusses "The Utilization of Acridine in Clinical Medicine" and, more interesting still, a fundamental consideration of the connection between chemical structure and antibacterial, antimalarial activity and general pharmacological action.

Part four comprises a group of four chapters and seventy pages devoted to the uses of acridines as dyestuffs and the connection between constitution and color in the group, the analytical uses of acridines especially as fluorescent substances, and finally a treatment of the miscellaneous uses of acridines with special reference to chemiluminescence.

The reviewer was impressed particularly by the thoroughness with which the whole subject is discussed. This volume is highly recommended not only to those who have a special interest in pyridine derivatives but also to all those who enjoy examining an authoritative and stimulating elucidation of the place of one ring system in the surrounding areas of chemical, physical and biological science. The printing and binding are good but the quality of the paper leaves something to be desired.

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E. D. AMSTUTZ

Sourcebook on Atomic Energy. By SAMUEL GLASSTONE, Consultant to the United States Atomic Energy Commission. D. Van Nostrand Co., Inc., Publishers, 250 Fourth Avenue, New York, N. Y., 1950. 546 pp. 16.5 × 23.5 cm. Price, \$2.90.

In a foreword, Gordon Dean says "Early in 1948 the American Textbook Publishers' Institute requested the Atomic Energy Commission to prepare a comprehensive sourcebook on atomic energy for the use of textbook authors and editors . . ." I am afraid that this objective has not been fulfilled; any prospective author of a textbook on atomic energy will not be very much helped by the present book, for, unless he wishes to quote directly from it, he will have to make a complete literature search himself. Insofar as I can see, there is not a single reference to any of the original literature from which the book was compiled. Names of people who made important discoveries are always given, as well as the dates when the discoveries were made; but how much nicer would it have been to have referred to the particular issue of the *Physical Review* where the exciting work in fission was published in 1939, or the Italian journal in which Fermi published his thrilling work on the production of artificial radioactivity by neutron bombardment, in 1934, instead of leading the prospective author on so smoothly and then letting him down to the task of making his own literature survey.

There are name and subject indices; however, in both of these indices references are not made to page numbers, but rather to chapter and paragraph numbers, which to me seems a rather vexatious system, since it involves thumbing through the book to find a particular chapter and then additional thumbing to find the paragraph in question.

Each page of the book is printed with two columns of type. The typography is good and various diagrams are simple and clear. The essential information concerning atomic structure, energy and radiation, natural radioactivity, artificially produced nuclear reactions, particle accelerators, etc., necessary for an understanding of atomic fission, is very clearly and nicely presented. This is then followed by a description of nuclear fission and the utilization of nuclear energy through the use of nuclear reactors. There is also a

chapter on plutonium and the transuranium elements. The book concludes with chapters on the uses of isotopes as tracers, cosmic rays and mesons, and the protection of individuals from radiation.

Glasstone writes very clearly and beautifully, and his explanation of various equations ought to be very clear to non- or semi-technical people. I believe that the book will be particularly useful to people who are not specialists in the field but who have some scientific background and who wish to have a rather broad, although superficial, knowledge of the subject. I would think that it would be particularly appealing and inspirational for bright boys in high school who intend to major in science. I am sure that the book would lead not a few of them to make nuclear science their life work.

DEPARTMENT OF CHEMISTRY
THE JOHNS HOPKINS UNIVERSITY ROBERT D. FOWLER
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Organic Reactions. Volume VI. ROGER ADAMS, Editor-in-Chief. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y., 1951. viii + 517 pp. 16 X 23.5 cm. Price, \$8.00.

The sixth volume of this now very well known and useful series maintains the high standards of the previous volumes. The several chapters have been contributed for the most part by authorities whose personal experience and knowledge of the reactions discussed are extensive. The reactions selected for inclusion in this volume have at least as great utility and generality as those of previous volumes, and Dr. Adams and his Board are to be congratulated for another splendid contribution to the permanent literature of organic chemistry. The reactions treated include the Stobbe condensation, the preparation of 3,4-dihydroisoquinolines and related substances by the Bischler-Napieralski synthesis, the preparation of tetrahydroisoquinolines by the Pictet-Spengler reaction, Oppenauer oxidation, the preparation of phosphonic and phosphinic acids, halogen-metal interconversions with organolithium compounds, preparation of thiazoles and, finally, the use of lithium aluminum hydride in reductions.

DEPARTMENT OF CHEMISTRY
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Methods of Vitamin Assay. Second Edition. Revised and Supplemented. Prepared and Edited by the ASSOCIATION OF VITAMIN CHEMISTS, INC., Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y., 1951. xviii + 301 pp. 16 X 23.5 cm. Price, \$5.50.

The continued accumulation of new knowledge concerning the vitamins, vitamin technology and vitamin assay methods has prompted the Association of Vitamin Chemists, Inc., to revise and to bring up-to-date their widely accepted handbook published in 1947 under the title "Methods of Vitamin Assay." Such a revision was also encouraged by the numerous suggestions received from users of the First Edition. This revision has recently appeared as the Second Edition under the original title.

The Second Edition represents both a revision and an enlargement of the First Edition. While the original organization of material and style of presentation employed successfully in the First Edition has been retained for the most part, certain minor changes in organization have been instituted and these changes should serve to enhance the usefulness of the volume. For instance, the chapter relating to Ascorbic Acid Assay has been brought forward and placed in a position more in keeping with the importance of and the frequency in which assays are made for this vitamin.

The inclusion of six new chapters, for the most part, accounts for the increase in the total number of pages. A new chapter entitled "Microbiological Assay Technics" has been inserted in the volume before proceeding with a discussion of assay methods applicable to some of the B vitamins. New chapters concerning methods of assaying for pantothenic acid, vitamin B₆, folic acid, biotin and vitamin B₁₂, respectively, have been included. The chapter, origi-

nally entitled "Other Vitamin Methods," has been revised and now appears under the title "Methods for Other Vitamins." Under this chapter are listed vitamins D, E and K, and *p*-aminobenzoic acid, inositol and choline.

Chapter 1, entitled "Sampling for Analyses" has been enlarged to include a discussion of statistics as applied to sampling, whereas, Chapter 2, relating to methods of assaying for vitamin A has been revised so as to include an ultraviolet absorption method of assay essentially as outlined in the U.S. Pharmacopoeia (XIV Revision). The chapter on Ascorbic Acid Assay (Chapter 4) has been enlarged to include the indophenol-xylene extraction method while the fermentation method of assay has been omitted from the chapter relating to Thiamine Assay (Chapter 5). The added chapter entitled "Microbiological Assay Technics" (Chapter 6) covers in a general manner the basic principles involved in assaying for vitamins by the microbiological procedure. This chapter seems to be well written and undoubtedly will prove a worthwhile addition to the text. The chapter on "Riboflavin Assay" (Chapter 7) has been revised to include a microbiological method of assay. Likewise, the chapter on "Niacin Assay" (Chapter 8) has been revised and enlarged to include, in addition to the microbiological method of assay, two modifications of the cyanogen bromide method. The five new chapters (Chapters 9, 10, 11, 12 and 13) relating to methods of assaying for pantothenic acid, vitamin B₆, folic acid, biotin and vitamin B₁₂, respectively, involve only microbiological methods of assay. The chapter entitled "Methods for Other Vitamins" (Chapter 14) has been completely rewritten and enlarged to include more detailed discussion of the specific problems involved in attempting to carry out assays for the several vitamins listed under this chapter. The final chapter (Chapter 15) entitled "Use of the Check Sample in Control of Vitamin Methods" remains as it appeared in the First Edition. The bibliography of "Cited Literature" appearing at the end of each chapter has been increased in most instances by the inclusion of new references.

The second Edition of "Methods of Vitamin Assay" appears relatively free of typographical and other errors. In the opinion of the reviewer, this Second Edition represents a marked improvement over the former edition and should continue to receive wide usage in research and in analytical laboratories. It should also prove useful in the classroom, particularly if its contents are supplemented by a discussion of the various principles and theories underlying the recommended assay procedures.

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Natural and Synthetic High Polymers. High Polymers. Volume IV. Second Completely Revised and Augmented Edition. By KURT H. MEYER, Professor of Chemistry, University of Geneva, Switzerland. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1950. xx + 891 pp. 16.5 X 23.5 cm. Price, \$15.00.

This second edition of Meyer's well-known book on the general chemistry of macromolecules is substantially larger and covers more material than the first edition, which was essentially a descriptive presentation of the synthesis, purification and properties of natural and synthetic high polymers. This volume does not only contain these facts and data, but there are also added a few chapters on the interpretation of these facts in terms of physical chemical theories concerning the properties of macromolecules in solution and the elasticity, viscosity and plasticity of high polymers in the bulk phase. The descriptive chapters on Inorganic Polymers, Polymeric Hydrocarbons, Esters, Ethers and Sulfides on Cellulose, other Polysaccharides, Lignin and Proteins are essentially of the same character as in the first edition; the enumeration of the individual substances is well organized and as complete as can be expected in a volume of this size; the presentation of their fundamental properties and of their chemical behavior is critical and conservative; emphasis is placed, in any case, on the communication of numerical data such as density, softening points, index of refraction, molecular weight, dielectric constant and so on, which gives to the book the very valuable character of a reference volume on quantitative data. The chapter on proteins is particularly expanded and brought up to date in

view of the rapid growth of this important branch of polymer chemistry. The new chapters on the physical chemical aspects of polymers in solution and bulk are written together with A. J. A. van der Wyk and begin with a clear, brief and rigorous treatment first of the thermodynamics of binary systems in general and then of polymer solutions in particular. They continue with the discussion of swelling, solubility, fractionation, gelation, with the kinetic theory of rubber elasticity, of viscosity and plasticity and are terminated by a discussion on the fundamental properties of films, fibers and membranes. The text is lively written, full of interesting and stimulating research, illustrated by many well designed figures and documented by a series of carefully selected tables. The book is a standard work in its field and the authors deserve the gratitude of their colleagues for having it brought out in such a comprehensive, complete and stimulating form. Printing, illustrations and tables are well done and support the excellent impression which this volume makes on its readers.

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An Introduction to Statistical Analysis. By WILFRID J. DIXON, Associate Professor of Mathematics, University of Oregon, and FRANK J. MASSEY, JR., Assistant Professor of Mathematics, University of Oregon. McGraw-Hill Book Company, 330 West 42nd Street, New York 18, N. Y. 1951. x + 370 pp. 16 × 23.5 cm. Price, \$4.50.

This is a textbook for an introductory undergraduate course in statistics, not written for physical scientists in particular but rather for students "from all fields in which statistics finds applications." The book is as non-mathematical as possible, nothing more than a knowledge of algebra being required of the reader. In spite of this, a number of modern statistical developments are included in the later chapters.

In the present reviewer's opinion, this is an excellent textbook and certainly accomplishes its purpose, but it will not be especially useful for most chemists.

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The Phase Rule and Heterogeneous Equilibrium. By JOHN E. RICCI, Professor of Chemistry, New York University, New York, N. Y. D. Van Nostrand Company, Inc., 250 Fourth Avenue, New York 3, N. Y. 1951. xi + 505 pp. 16 × 23.5 cm. Price, \$12.00.

According to Professor Ricci's preface, "The purpose of this book is to offer a systematic study of the meaning and application of the Phase Rule which may be general enough to be used as reference for almost any application of the principles. Since the principles of phase diagrams are fundamentally simple, the emphasis has been placed on the interconnection between the familiar diagrams of systems of various orders, or numbers of components. The attempt has been made to point out and utilize as much as possible the basic identity of typical diagrams for a variety of relations. . . . The principal difference between the systematic exposition here attempted and that usually followed lies, perhaps, in starting with continuous miscibility in all states as the simplest possibility both in binary and ternary systems. . . . Although the book is concerned primarily with the underlying principles rather than with detailed examples and applications, an attempt has been made to include specific illustrations of the more important and interesting relations. The book is not intended, however, to serve as source of numerical information on any particular substance or system of substances. . . ."

If for "principles" in the last part of the above, one reads *geometry*, the reviewer would say that the author has attained his goals with reasonable success. One chapter is devoted to an introduction, and derivation and interpretation of the phase rule, and one chapter given to one-component systems and the Clapeyron equation. Seven chapters on binary systems, six on ternary, two on quaternary and one on quinary systems complete the presentation. The possible

geometric variations of two-dimensional phase diagrams are explored systematically, starting with miscible systems, and are related to the three-dimensional delineations of systems of which they are sections. No quantitative data are given about any real systems, and only in the case of a few types of diagrams of unusual detail is reference made to a real system which illustrates the diagram.

In attempting to assess the usefulness of the volume to the chemical public, the reviewer is at somewhat of a loss. In his understanding, phase diagrams are condensed descriptions of real systems, and the phase rule is a tool to enable one to develop such descriptions with economy of effort, and for critical distinction of certain features in the relations within a system. With the aid of the descriptions afforded by adequate phase diagrams, one can devise rational procedures for separating and purifying chemical substances, testing for chemical purity, calibrating thermometers, chilling, thermostating, desiccating, hygrostatic, determining solid compound formation and composition in favorable cases, and a number of other such *practical* purposes. By the turn of the century, the general and detailed character of phase relations and individual phase diagrams had been sufficiently completely laid out that a number of definitive treatises on the subject had been published or initiated. In the fifty years since then, chemistry has laid heavy stress on the "how" and "why" of chemical reaction and stability relations. One might have expected a book of this size on heterogeneous equilibrium published in 1950 to show this influence, by emphasizing the application of the readily grasped principles of the phase rule and construction of phase diagrams to problems of the sort mentioned above, and by discussion of modern concepts of the factors *determining* equilibrium phase relations—relative lattice energies of solids, structural factors in formation of solid solutions, nature and energetics of interactions in the liquid phases, and so forth. The heavy accent put by the author on the geometric aspects of the phase diagrams places the practical applications in the position of appendages, and even makes their location in the volume and their understanding matters of difficulty. The avoidance of real systems has furthermore left the author no basis for discussing determinative factors. One presumes therefore that the principal uses of the volume might be in preliminary orientation for researchers commencing new phase work, or as a reference for checking the possible three-dimensional implications of a system whose diagram is known in two dimensions.

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Metallurgical Thermochemistry. By O. KUBASCHEWSKI, Dr. Phil. Nat. Habil., Research Chemist at the National Physical Laboratory, Teddington, Middlesex, and E. I. L. EVANS, B.Sc., Scientific Officer at the National Physical Laboratory, Teddington, Middlesex. Academic Press Inc., Publishers, 125 East 23rd Street, New York 10, N. Y. 1951. xi + 368 pp. 14 × 22 cm. Price, \$6.00.

The preface states that, "The present monograph is intended for two classes of metallurgical chemists: the research worker engaged in obtaining the fundamental information by laboratory experiments, and the process metallurgist who wishes to apply the data to the solution of practical problems." Obviously, therefore, the work was not intended to be a textbook, although it might serve as a basis for further training in calculations for students who have completed the ordinary basic courses in thermodynamics.

The book begins with a section on "The Theoretical Basis" in which is given a brief discussion of the basic theoretical background necessary for the understanding and use of thermodynamic data. Thermodynamic relationships are listed without attempting proofs or derivations.

The following section on "Experimental Methods" discusses several types of calorimeters described in the literature, including some unusual ones developed for special purposes. There is also a brief consideration of electromotive force measurements and a quite detailed discussion of the measurement of vapor pressures and other heterogeneous equilibria. A minor criticism is that too much emphasis sometimes is placed upon more or less obsolete methods and devices. An example of this is the treatment of calorimetric

thermometry, in which the Beckmann thermometer is emphasized while resistance thermometers and thermocouples are only briefly mentioned. (This reviewer has not seen a Beckmann thermometer in operation for 25 years.)

The section on "The Estimation of Thermochemical Data" includes heat capacities at high temperatures, entropies at 298°K., heats and entropies of transition, fusion and vaporization and heats of formation. The methods described for estimation of entropies are subject to considerable improvement. (For example, see the recent paper by W. M. Latimer in THIS JOURNAL.) The other parts are quite adequate and the discussion of methods of estimating heats of formation is particularly good.

About a third of the book is taken up by the section on "Thermochemical Data," which consists largely of tables of values, both experimental and estimated, with a few introductory pages of discussion. The authors are pessimistic as to the accuracy of most heats of formation and have assigned larger than usual uncertainties to their selected values. This is based upon consideration of the modifications in values that have occurred over the years. As regards the more modern data, the reviewer suspects that the authors have been unduly influenced by the many inconsistent values put forth by one particular European source.

In the table of free energy equations there are many inconsistencies between the assigned errors and those given for the basic data in previous tables. For example, the heat, entropy and high temperature heat capacity data related to the formation of calcium oxide indicate that free energies may be obtained for temperatures in the range 298 to 1424°K. with an uncertainty of less than ± 1 kcal./mole. The free energy equation listed, however, is assigned ± 7 kcal./mole uncertainty. Also, for ease of calculation, the authors have adopted very simple, empirical free energy equations. This has one bad feature which is that heats and entropies of reaction cannot necessarily be extracted for any particular temperature (although if the equations are valid, it follows that average values for a wide range of temperature are extractable).

The authors close with some examples of thermodynamic calculations covering, among others, such subjects as the silicon reduction of magnesia, the deoxidation of steel by silicon and aluminum, and the determination of phase boundaries.

The book throughout is written in a readily comprehensible style, and, despite some faults, should be a handy addition to the library of any laboratory concerned with thermodynamics of inorganic substances.

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The Friction and Lubrication of Solids. By F. P. BOWDEN AND D. TABOR. Oxford University Press, New York, N. Y., 1950. xii + 377 pp. Price, \$7.00.

This book is a valuable contribution to fundamental science and will prove interesting to chemists, physicists, engineers and others concerned with the remarkable properties of solid surfaces in rubbing contact. It is centered around the well-known papers of Bowden, Tabor and their colleagues in the Cambridge and Melbourne schools of tribo-physics, and retains the clarity of presentation which has characterized their many publications during the past fifteen years. The style is in fact exceptional in the field of modern scientific writing, being remarkably clear, penetrating and sometimes rather delightful. In the extensive experimental work which is described and which forms the very substantial framework of the book, recourse to many of the advanced modern tools is consistently made; e.g., high frequency recording with oscilloscopes, electron diffraction, electron and other microscopes, radioactive tracers, etc., so that each division of the subject is illumined from various independent viewpoints. The bibliography is thorough and the results of other researches are heavily drawn upon.

An impression of the breadth of the work is had from the chapter headings: (1) "Area of contact between solids," (2) "Surface temperature of rubbing solids," (3) "Effect of frictional heating on surface flow," (4) "Friction and surface damage of sliding metals," (5) "Mechanism of metallic friction," (6) "Action of bearing alloys," (7) "Friction of

clean surfaces and effect of contaminant films," (8) "Friction of non-metals," (9) "Boundary friction of lubricated metals," (10) "Mechanism of boundary lubrication," (11) "Action of extreme pressure lubricants," (12) "Breakdown of lubricant films," (13) "Nature of contact between colliding solids," (14) "Nature of metallic wear," (15) "Adhesion between solid surfaces and influence of liquid films," (16) "Chemical reaction produced by friction and impact."

The statement in the preface, also quoted on the flyleaf, that the book "is not a general text-book since it deals almost entirely with experimental researches carried out by the writers and their collaborators and colleagues" may prove misleading to some since the work of the present-day Cambridge school in this field is of course inseparably related to that of a distinguished list of scientists who have also generously contributed a number of the foundation stones to the subject and who, historically, within this volume, we must reluctantly note, do not quite appear always in their true perspective. This is less the fault of the authors perhaps, than it is the frequent result (common with most of us) of a natural and perhaps more appreciative enthusiasm for the research lying nearer to the hearts of the writers. In the chapter on area of contact between solids, for instance, the primary reference to the electrical resistance method reads simply, "Holm 1946; Bowden and Tabor, 1939." This is certainly an oversight in view of the eminence which Holm's pioneering work has for many previous years commanded in this part of the field.

As a minor but interesting sidelight, the book shows the astonishing insight which was held more than four centuries ago by Leonardo da Vinci concerning some aspects of friction.

THE GENERAL ELECTRIC RESEARCH LABORATORY
GENERAL ELECTRIC COMPANY R. H. SAVAGE
SCHENECTADY, NEW YORK

Preparation of Organic Intermediates. By DAVID ALLEN SHIRLEY, Associate Professor Chemistry, Tulane University of Louisiana. John Wiley and Son, Inc., 440 Fourth Avenue, New York 16, N. Y., 1951. x + 328 pp. 16 X 23.5 cm. Price, \$6.00.

The following quotation from the preface of this book outlines the basis for the selection of compounds.

"The compounds included satisfy the following criteria: (1) the compound either is not available commercially or if available is relatively expensive; (2) directions for preparation of the compound had not been included in *Organic Syntheses* through Volume 38; and (3) the compound is one whose structure is simple and contains reactive functional groups which make it useful as an intermediate, or its preparation involves a generally useful type of organic reaction and the directions may be applied to the preparation of related compounds." The directions for the more than 500 preparations are taken directly from the literature. The author recognizes the difficulties inherent in such a procedure, but believes "that, by a careful and critical examination of the preparative information available from the literature, it is possible to select procedures that have a high probability of giving the indicated results." It is the opinion of the reviewer that the selection of compounds and the procedures for their preparation has been well done.

A molecular formula index, a type of reaction index and a general index make it a simple matter to locate information contained in this book.

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Distillation. Editor: ARNOLD WEISSBERGER, Research Laboratories, Eastman Kodak Company, Rochester, N. Y. Contributors: Arthur and Elizabeth Rose, Arthur L. Glasebrook, Frederick E. Williams, Carl S. Carlson, John R. Bowman, R. Stuart Tipson, Edmond S. Perry and John C. Hecker. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1951. xxvii + 668 pp. 16 X 23.5 cm. Price, \$14.00.

This is Volume IV of the series dealing with "Technique of Organic Chemistry." It constitutes an extensive treat-

ment of distillation and can be recommended to the serious student of this topic.

Chapter I, prepared by Arthur and Elizabeth Rose, is entitled "Theory" and opens with the following quotation from Della Porta (1589):

"Now I am come to the arts and I shall begin from distillation, an invention of later times, a wonderful thing to be praised beyond the power of men; not that which the vulgar and unskilled men use, for they do but corrupt and destroy what is good; but that which is done by skillful artists. . . . Let one that loves learning and to search Nature's secret, enter upon this; for a dull fellow will never attain to this art of distilling."

Then follows an excellent discussion (173 pages) organized under the following headings: (a) Introduction, (b) Vapor-Liquid Composition Relations, (c) Theoretical Plates, Reflux Ratio and Column Compositions, (d) Differential Equations of Performance, (e) Distillation Curves in Batch Distillation, and (f) Calculated Effect of Process Variables in Batch Distillation.

Chapter II (140 pages), prepared by A. L. Glasebrook and F. E. Williams, deals with the apparatus and procedure of ordinary Fractional Distillation. It includes such topics as (a) Types of Columns, (b) Condensers, (c) Still Pots, (d) Heating, Control of Heat Input and Temperature Measurements, (e) Pressure Controls, (f) Miscellaneous Accessories, and (g) various procedures such as pretreatment of distilland, establishing primary equilibrium, product collection, etc.

Chapter III (78 pages) is entitled "Extractive and Azeotropic Distillation" and was prepared by Carl S. Carlson. Modification of the volatilities of the components of a mixture to be separated, by the addition of certain solvents, which forms the basis for extractive and azeotropic distillation finds extensive use in industry. Apparatus and procedures, theoretical considerations, and factors to be considered in the selection of the solvent are ably discussed in this section.

The titles of Chapter IV (72 pages), "Distillation of liquefied Gases and Low-boiling Liquids," by Arthur and Elizabeth Rose; and V (31 pages), "Distillation under Moderate Vacuum" by John Bowman and R. Stuart Tipson, indicate their content.

Chapter VI (107 pages) is devoted to Distillation under High Vacuum. It is divided into two parts; one dealing with the distillation process and with still designs, and the second part considers the vacuum system. This chapter was prepared by E. S. Perry and J. C. Hecker. Distillation rates, gas flow at reduced pressures, vacuum pumps, gages, traps, etc., all receive their share of attention. The concluding chapter VII (42 pages), written by R. Stuart Tipson, deals with Sublimation.

This book contains many excellent drawings which enhance the usefulness of this volume. The liberal citation of references, together with general references which appear at the end of each chapter, will also be appreciated. The authors and publishers of this volume are to be commended.

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WALTER M. LAUER

Substances Naturelles de Synthèse. Volume I. By LÉON VELLUZ, Editor, Docteur ès Sciences Physiques. Masson et Cie, Editeurs, 120, Boulevard Saint-Germain, Paris 6^e, France, 1951. 141 pp. 16 × 23 cm. Price, br. 1200 fr; cart. 1800 fr.

This volume, the first of a series, is not readily assigned to any of the usual categories of books dealing with organic chemistry. It contains detailed procedures on the laboratory scale for the preparation of the following important natural products: ascorbic acid, adenine (including isotopically labeled material), adenosine, chloromycetin, esculetin, *dl*-histidine and *l*-tryptophan. The procedures are taken from the literature, and although it is not stated that they have all been checked in the author's laboratories, it is apparent that they embody in some cases the results of first-hand experience.

Each synthesis is followed by several notes, dealing with either practical or theoretical points related to the reactions described. These notes, while not extensive, contain a good deal of useful information in a small space, and, as Du-

fraisie points out in his appreciative introduction to this volume, encourage the reader to investigate in more detail some of the points discussed.

This volume also contains concise yet comprehensive articles on the synthesis of coumarins, and of pyrimidines and quinazolines; both articles are followed by tables illustrating the various types of cyclization discussed, with recent examples and references. In addition, there are sections devoted to methods of purification of common solvents, and to dehydrating agents, as well as several tables useful to research workers.

It will be seen that this book essays to fulfill some of the functions of "Organic Syntheses," "Organic Reactions," the review journals and the books on laboratory technique. It seems certain that it will make a very useful contribution to advanced training and research in organic chemistry in France. American graduate students could read it with much benefit to their knowledge of organic chemistry, as well as to their (frequently lamentably poor) grasp of the French language. Organic chemists in general would find it interesting. The reviewer's pleasure in reading the book was notably enhanced by the excellent typography and format.

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BOOKS RECEIVED

September 10, 1951–October 10, 1951

- J. M. BIJVOET, the late N. H. KOLKMEYER, AND CAROLINE H. MACGILLAVRY. "X-Ray Analysis of Crystals." (Based on a translation by H. Littman Furth). Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1951. 304 pp. \$6.50.
- G. MALCOLM DYSON. "A Short Guide to Chemical Literature." Longmans, Green and Co., Inc., 55 Fifth Avenue, New York, N. Y. 1951. 144 pp. \$2.00.
- DONALD E. H. FREAR. "Agricultural Chemistry. A Reference Text." Volume One. Principles of Agricultural Chemistry. D. Van Nostrand Company, Inc., 250 Fourth Avenue, New York, N. Y. 1951. 812 pp. \$9.00.
- J. R. PARTINGTON. "An Advanced Treatise on Physical Chemistry." Volume Two. The Properties of Liquids. Longmans, Green and Co., Inc., 55 Fifth Avenue, New York, N. Y. 1951. 448 pp. \$10.00.
- EUGENE I. RABINOWITCH. "Photosynthesis and Related Processes." Volume II, Part 1. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1951. 1208 pp. \$15.00.
- G. K. ROLLEFSON (Editor) AND R. E. POWELL (Associate Editor). "Annual Review of Physical Chemistry." Annual Reviews, Inc., Stanford, California. 1951. 462 pp. \$6.00.
- CHARLES SLESSER AND STUART R. SCHRAM (edited by). "Preparation, Properties, and Technology of Fluorine and Organic Fluoro Compounds." McGraw-Hill Book Company, 330 West 42nd Street, New York 18, N. Y. 1951. 868 pp. \$10.50.
- R. SMOLUCHOWSKI, J. E. MAYER AND W. A. WEYL (edited by). "Phase Transformations in Solids." (Symposium held at Cornell University, August 23-26, 1948). John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1951. 660 pp. \$9.50.
- W. THEILHEIMER. "Synthetic Methods of Organic Chemistry." Vol. 5. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1951. 612 pp. \$14.00.
- L. ZECHMEISTER. "Fortschritte der Chemie Organischer Naturstoffe." (Progress in the Chemistry of Organic Natural Products). Sixth Volume. Springer-Verlag, Wien 1, Molkerbastei 5, Germany. 1950. 392 pp. \$12.00.
- L. ZECHMEISTER. "Fortschritte der Chemie Organischer Naturstoffe." (Progress in the Chemistry of Organic Natural Products). Seventh Volume. Springer-Verlag, Wien 1, Molkerbastei 5, Germany. 1950. 330 pp. \$12.00.