

The book is very much up-to-date; literature is covered up to 1955, and many recent developments are mentioned, such as non-classical carbonium ions, benzyne, isotactic and graft polymers, conformational analysis, steric acceleration, internal return, methylene, phosphorus ylids, to name some. Unfortunately, often these are only briefly mentioned, and this points to a weakness of the book. The scope is so large that rarely is a reaction or a thought fully developed. Those familiar with the field will not miss many topics, but they will miss important arguments leading to established mechanisms, and often they will question details of the mechanism or of the interpretation, sometimes also statements of fact (for example, the statement that cinnamic acid is nitrated in the *meta* position). In particular, the almost complete lack of kinetic, and often of relevant stereochemical, arguments makes the presentation of many mechanisms seem categorical.

The book is not the pioneering work that A. Werner's very similarly entitled "Neuere Anschauungen auf dem Gebiete der Anorganischen Chemie" was when it was published in 1905, but it is a commendable and interesting one, and one that will fill a need in the German chemical literature. The American reader will find that many topics are treated more thoroughly in available books or monographs, but he may enjoy reading a book, not of selected topics, but of wider scope, also traveling over less familiar avenues, which is written in a mature way and from a uniform point of view, even though some details may be open to debate. He will be particularly interested to see how the material is presented to German students.

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on page 75. There are other instances where a name is spelled differently in the body of the chapter and in the reference list. The following sentence; "The oxidation from a valence of 3-6 can be effected by relatively weak oxidants, such as ferric ion, iodine, and oxygen." makes no sense at all because the valence change of 3-6 was substituted for the change of 2-3 given in the textbook. On the same page diprotic is rendered "diroptic," the charges on three ions are wrong as is one of the equations on the same page. On page 60 we find "oxidizing flux will contain reducing substances such as Na_2O_2 , H_2O_2 or nitrates." Again on page 61 ammonium nitrate is given in place of ammonium nitrite. On pages 63 and 67 there are errors in formulas and the chemistry of the determination of chromium in the presence of vanadium (p. 63) is garbled.

In Section II the chapter, The Physical and Chemical Properties of Chromium Compounds, is the longest and most exhaustive, covering nearly 140 pages. A very large number of chromium compounds, mostly inorganic, are considered, but short accounts also of chromium salts of organic acids and organometallic compounds are included. The chapter is replete with tables and diagrams and has an extensive list of references. It should be a valuable source of information for chromium chemists and the general reader.

The remaining nine chapters of this section are short (10 to 30 pages). They contain brief but adequate, interesting general surveys of the fields covered. Flowsheets, charts, tables, illustrations and extensive lists of references are included.

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WILLARD R. LINE

Chromium. Chemistry of Chromium and Its Compounds.

Volume I. Edited by MARVIN J. UDY, Chemical and Metallurgical Engineer, Niagara Falls, N. Y. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1956. xiii + 433 pp. 16 × 23.5 cm. Price, \$11.00.

This work is a new member of the American Chemical Society's series of Chemical Monographs, the first of which appeared in 1921. It is designed to cover the science and technology of chromium and its compounds. The preface calls attention to its difference from the usual monograph in that the various phases of chromium chemistry are covered by 36 different authors, making the book more like a series of monographs compiled in two volumes.

Volume I is divided into two sections. Section I is general and has five chapters on the history, mineralogy and geology of chromium, the relation of chromium to health, chromium in soils, plants and animals and the analytical chemistry of chromium. Section II with ten chapters comprises about three-fourths of the volume and bears the subtitle, Physical and Chemical Properties of Chromium Compounds, which is actually the subject matter of one chapter only. The remaining nine chapters deal with such topics as the production of chromium chemicals and their applications in the textile, tanning, oil and gas industries, in the graphic arts, in wood preservation and corrosion prevention.

This reviewer found the chapters in Section I, except the one on the analytical chemistry of chromium, well written and organized, informative, very interesting and remarkably free from typographical errors. References at the end of each chapter appear quite complete and up to date. The excellence of this section is, however, gravely marred by the form, content and numerous errors in the chapter on the analytical chemistry of chromium.

In attempting to bridge the gap between a review of the analytical chemistry of chromium and a compendium of the analytical methods for chromium the authors have landed in between with unhappy results. The account is, in part, too detailed to make a readable review yet lacks the details needed for the practical application of the procedures given. The main criticism, however, is that there are many errors in chemistry, formulas, spelling and English. To cite just one instance, errors of each kind, together with some loose writing, can all be found on page 57. Much of the material in the first two paragraphs on this page is a garbled excerpt taken from a textbook by Rieman, Neuss and Naiman. Incidentally the name of one of these authors is misspelled on page 57 and two of their names are misspelled

The Encyclopedia of Chemistry. GEORGE L. CLARK, Editor-in-Chief, Research Professor, University of Illinois, Urbana, Illinois, GESSNER G. HAWLEY, Executive Editor, Reinhold Book Division, New York, N. Y., and WILLIAM A. HAMOR, Advisory Editor, Director of Research, Mellon Institute, Pittsburgh, Pennsylvania. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1957. xvi + 1037 pp. 18 × 26 cm. Price, \$19.50.

With more than average courage, the authors of this book have undertaken the enormous task of bringing together in one volume fundamental information on the almost countless topics of chemistry and related fields. Topics are treated in alphabetical order and the scope of each is broadened by useful cross references. Contributions from over 500 authors, each a specialist in his field, are combined to make the book. Topics related to elements were listed as the element and compounds, except in those cases in which a group of compounds was important; these were listed as classes, *viz.*, Borates. In organic chemistry, compounds were listed as classes such as aldehydes, aliphatic compounds, excepting those compounds considered specially important. Fundamental areas of physical chemistry were treated as units excepting certain terms such as entropy, ϕH , free energy, which were listed as separate topics. The treatment of analytical chemistry is less obvious. Aside from such topics as analytical chemistry, analytical chemistry of radioactive elements, gravimetric analysis, titration and instrumentation and some material included incidental to other topics, this field of chemistry is not widely covered.

The editors have noted at least two major objectives, one, to preserve the function of an encyclopedia of chemistry by focusing each topic on the general subject of chemistry rather than a division of chemistry; and two, to present in an irreducible minimum of words, not only that material which has an essence of timeliness but also such fundamentals as will tend to prevent obsolescence after the book is published. The book is directed to "chemists, physicists, engineers, biologists, research workers, teachers and students who comprise the scientific population of the world." In order to understand the viewpoint of the authors, one should read the preface of this book. Having read the preface of the book, one is less likely to criticize seeming omissions in various topics or the choice of basic material included.

Three areas for which topics are provided must have unusual interest for the reader. These are: Names in Science, Scientific Societies and Research Institutes, Topics

Related to Chemistry. Names in Science includes the usual biographical material but in addition contains interesting contributions by the respective authors, which are not found in the usual sources. Scientific Societies and Research Institutes are described from an historical viewpoint and only the better known are included. Topics Related to Chemistry are so diverse that the reader cannot fail to be impressed and stimulated. A few illustrations will serve to indicate the breadth of sampling: antibiotics, brewing, bacteriology, detergents, fluidation, lakes, latex, mixing, oil resistance, plastics, refining, steels, seeds, toxicology, trade marks, wastes, water conditioning, waterproofing, wood, writing inks, yeast. Some items of applied chemistry are not listed as topics but appear in paragraphs within a topic.

How can one evaluate a book of this type? This reviewer is impressed by the coverage, the relative freedom from typographical errors and errors in fact. As mentioned above, this book is not a treatise. The specialist will not find a complete description of his own field. However, he will find great interest in the other topics which are related to his specialty and which focus on chemistry in general. For the scientist, there is a great fund of information the reading of which must give rise to new ideas and awaken new relationships.

The book is eminently worthwhile.

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Ion Exchangers in Organic and Biochemistry. By CALVIN CALMON, The Permutit Co., Birmingham, New Jersey, and T. R. E. KRESSMAN, The Permutit Co., Ltd., London, England, Editors. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1957. xii + 761 pp. 16.5 × 23.5 cm. Price, \$15.00.

In recent years ion exchange has come to be recognized by chemists as a most valuable tool. This book describes how ion exchangers have been and are being used in the various areas of biological and organic chemistry.

For the most part, each of the 37 chapters is written by a different expert or group of experts. In the first 9 chapters the general theoretical and practical aspects of ion exchange are discussed. Topics such as equilibria, kinetics, commercial materials and techniques, ion exclusion and ion exchange membranes are included. Then follows 28 chapters dealing with specific applications of ion exchange to rather specialized fields. Among these are the following: separation of amino acids, peptides and carbohydrates; ion exchange properties of cells and tissues; ion exchange techniques in enzyme studies; sodium and potassium removal *in vivo*; applications to the pharmaceutical industry; plant physiology; use in treatment of milk, alcoholic beverages and fruit juices; ion exchangers as catalysts; ion exchangers in organic chemistry; and water treatment.

This book is well written and contains much valuable information. There are a large number of references to original literature. As is apt to happen in a book of this type, the organization at times becomes cumbersome. So many facts are presented that the reader may lose sight of the important general principles and techniques of ion exchange. Nevertheless, this book should be very useful to biological or organic chemists who may have occasion to use ion exchange procedures.

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BOOKS RECEIVED

September 10, 1957–October 10, 1957

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