

NEW BOOKS

Old Chemistries. By EDGAR F. SMITH, University of Pennsylvania. McGraw-Hill Book Company, Inc., 370 Seventh Avenue, New York City, 1927. xi + 89 pages, 32 illustrations. 26 × 18.5 cm. Price \$2.50.

The chemists who have had the good fortune to read this latest volume by Professor Smith have no doubt been tempted, as was the reviewer, to alter the old familiar motto of Alonzo of Aragon into "Old wood to burn, old wine to drink, old friends to trust and old chemistries to read." It is indeed just such a book as one would delight to discuss with a well-trying friend on a wintry evening when the wood fire is blazing merrily and while there is still left, perchance, a little of the precious vintage of former days.

Those visitors, who have penetrated to the innermost sanctum of Professor Smith's office, with its priceless collection of old chemistries and prints and with its scores of framed portraits of chemists looking down from the walls like a cloud of witnesses, know that there is no more fascinating hobby than the pursuit in leisure hours of the cultural side of one's vocation. Professor Smith's object, as modestly stated in his preface, is "to lay before interested readers a hint of the vast stores of early literature relating to chemistry." The book, however, is more than a hint and might almost be termed an anthology, so varied and so interesting are the selections to which the reader's attention is called. Some fifty authors are cited whose published works extend over a period of three centuries, from an edition of Geber printed at Nuremberg in 1545 down to the "Muck Manual" of Samuel L. Dana, printed at Lowell, Massachusetts, in 1842. In addition to ancient works upon alchemy, there are mentioned old treatises, histories, catechisms, conversations, compendia, epitomes, manuals, systems, elements, essays, lectures, dissertations and philosophies of chemistry—a list so general and comprehensive that every chemist, no matter how specialized, will find much to attract his interest. The references to these volumes are enlivened by the sympathetic comments of the author as he opens his treasures before us and calls our attention to this or that passage or illustration. The company to which the reader is admitted is a select one, including not only European celebrities, such as Black, Bergmann, Fourcroy, Lavoisier, Chaptal, Orfila, Parkes, Thomson and Accum, but early American authors such as Rush, Ewell, Macneven, Gorham, Bache, Silliman, Hare and others. The well chosen illustrations of apparatus, title-pages, lecture cards, chemists, etc., lend additional interest to the volume. There are portraits which, once seen, the reader will never forget, such as the cherub face of Boerhaave and the delightful antique of Mrs. Marcet in lace cap and curls. There are also letters, such as the historic message of Lavoisier to Franklin and the charming congratulatory note of John Adams to Gorham which, once read, will stimulate a second and a third perusal.

It is not for correct theories or practical values that we consult the old chemistries which Professor Smith has placed before us, but for a draught of the spirit and enthusiasm with which these works were written. Such, for example, was the glowing zeal of the young Philadelphian, John Pennington, who was stricken by yellow fever in 1793 at the early age of 25, and the title-page of whose "Chemical and Economical Essays" is reproduced in the present volume.

On the first page of his book Professor Smith laments "that in these days of action little patience is had with tales of the past." Posterity, however, will have its revenge for there will be even less of patience a century hence with the chemistries of today. It was Emerson, the wisest of American critics, who wrote that "science must be studied humanly" and it is for the lack of this human element that chemistry is suffering at the present time. The chemists of America may most truly be thankful to Professor Smith that by the single example of this new volume he has refuted the charge of European critics that chemistry in America is wholly industrialized. There are many in this country who believe that chemistry has higher messages than those of industrial benefits—"messages in history, in philosophy, in economics, in social relations, in art, in international relations, in literature and in a wide and extensive culture," to quote from the concluding sentence of Professor Smith's new book. To all chemists, and especially to those who believe in these other messages, the present volume upon "Old Chemistries" is most cordially recommended.

C. A. BROWNE

Recent Advances in Physical and Inorganic Chemistry. By ALFRED W. STEWART, D.Sc., Professor of Chemistry in the Queen's University of Belfast. Fifth edition, Longmans, Green and Company, 55 Fifth Avenue, New York, 1926. xi + 312 pp. 35 figs. 22 × 14 cm. Price \$6.50.

Some seven years have elapsed since the publication of the last (fourth) edition of this book. The author has, therefore, been obliged practically to rewrite it. Only five chapters have survived with minor alterations; twelve new chapters have been added and a corresponding number of chapters in the old edition eliminated. These new chapters deal with hafnium, isobars, the results of mass-spectrography, the segregation of isotopes, the structure of the atom, active hydrogen and nitrogen, some new hydrides, the effect of intense drying and Tesla-luminescence spectra.

These subjects are presented with the same clarity and enthusiasm which characterized the earlier edition. The book represents a useful and valuable digest of the recent progress in the fields which it attempts to cover.

ARTHUR B. LAMB

Physico-Chemical Metamorphosis and Some Problems in Piezochemistry. By ERNST COHEN, University of Utrecht. The George Fisher Baker Non-Resident Lectureship in Chemistry at Cornell University. McGraw-Hill Book Company, Inc., 370 Seventh Avenue, New York City, 1926. 190 pp. 58 figs. 23.5×15.5 cm. Price \$2.50.

In the introductory lecture to the series of twenty-one discourses which make up this volume, Professor Cohen quotes from the French savant "Ce n'est pas assez de savoir les principes, il faut savoir manipuler." The book shows that the author has indeed taken this to heart. With charming style and very simply he lays forward and illustrates by examples the principles of polymorphism and some of the problems dealing with the behavior of chemical systems under pressure. At the same time he misses no opportunity of enlarging on those details of experimental technique for which the Laboratory at Utrecht is justly famous. His developments of the electrical methods for investigation of transition points, solubilities, etc., are particularly worthy of notice.

The object of the book may be stated in the author's own words. "It is my purpose to tell you systematically what external conditions of temperature, pressure, solvent, etc., cause the formation of modifications of the same substance and what consequences their existence will have." We think he has succeeded. No one can read the first half of the book without having his ideas of the sanctity of physico-chemical constants and of the nature of matter very salutarily shaken.

The book is easily read and will appeal to all students of physical chemistry; in particular, teachers of the subject should find it very inspiring. Like most series of lectures, however, it deals more with the aspect of the subject as viewed by the author than with the subject as a whole. Hence, its main use to the specialist in the field is as an index to the work of the Utrecht school.

The book is well printed, adequately illustrated and indexed, and the few typographical errors are unimportant.

R. E. GIBSON

Anorganische Chemie. (Inorganic Chemistry.) By Dr. ROBERT SCHWARZ, Professor of Inorganic and Analytical Chemistry at the University, Freiburg. Theodor Steinkopff, Dresden and Leipzig, 1927. xi + 139 pp. 22×15 cm. Price, unbound, M. 8; bound, M. 9.20.

This is a further volume in the series of monographs edited by Dr. Liesegang designed to summarize the progress of research in the various fields of natural science since 1914. Earlier volumes in this series have already presented some features of the progress in inorganic chemistry; for instance, Physical Chemistry, by Benrath; Colloidal Chemistry, by Liesegang; Mineralogical Chemistry, by Eitel; and Atomistics, by Gerlach.

The present volume is particularly concerned with *experimental* inorganic chemistry.

Each element is separately discussed, the order being that of the periodic system. This discussion occupies three quarters of the volume. There are in addition a short chapter devoted to such general topics as the concept of an element, the color of inorganic compounds and the hydrogen compounds of the elements, and another on complex compounds.

In a more convenient form but less complete, this volume covers substantially the same ground as do the "Annual Reports" of the Chemical Society of London in their chapters on Inorganic Chemistry.

ARTHUR B. LAMB

Die Welt der Atome. Zehn gemeinverständliche Vorträge. (The World of Atoms. Ten Popular Lectures.) By Dr. ARTHUR HAAS, Professor of Physics at the University, Vienna. Walter de Gruyter and Company, Berlin, W10, Germany, 1926. xii + 130 pp. 37 figs. 23.5 × 15 cm. Price, unbound, M. 4.80; bound, M. 6.

This book contains, in printed form, a series of lectures delivered to a general audience at the University of Vienna in 1926. The book starts with a short discussion of the Philosophy of Democritus and the first chapter presents some of the general ideas of the atomic theory with the lines of supporting evidence. The structure of electricity and the means of determining the absolute masses of the atoms are clearly discussed. The second chapter discusses the "building stones for atoms." Prout's hypothesis is mentioned and the chapter gives a rapid discussion of cathode rays, alpha-ray tracks, positive-ray analysis and atomic disintegration by alpha-particle bombardment. The following chapters take up in succession "Light Quanta," "Spectra and Energy States," "The Hydrogen Atom," "Elements," "The Atom as a Planetary System," "Molecules," "Radioactivity" and "Transmutation of the Elements."

The author has made a sincere attempt to bring the material included up to date. For example, illinium is included in the list of elements, and the work by Millikan and his co-workers on "stripped atoms" is discussed. The Bohr theory is accepted frankly as the best picture we have of the structure of atoms. The author might be criticized for not stating some of the objections to this theory. In general, the author has included impartially the important pieces of work in the various fields, although the list of workers is necessarily not complete. It might seem somewhat of a mistake not to mention any American contributions in such fields as the determination of the velocity of light, the determinations of the atomic weight of lead from radio-active minerals, the separation of isotopes by diffusion and positive-ray analysis, since other work, frequently not as accurate, is included.

A reader who had had no previous contact with the ideas presented

in the book might find it difficult reading. Any one who has some knowledge of the trend of physics will find the book useful in presenting a connected and logical picture of current ideas. The author has sacrificed rigor for ease of presentation in a few instances but, on the whole, the book is remarkably free from the sort of looseness so frequently encountered in popular treatments of this subject.

W. ALBERT NOYES, JR.

Der Bau der Atome und das periodische System. (The Structure of Atoms and the Periodic System.) By IVAN KOPPEL, Professor at the University, Berlin. Leopold Voss, Leipzig, 1927. vi + 174 pp. 47 figs. 22.5 × 14.5 cm. Price, unbound, M. 9; bound, M. 10.50.

This is a brief attempt to recount and interpret for chemists or for students of chemistry some of the results of modern atomic physics. The author recognizes the necessarily arbitrary nature of the task of selecting material of special importance and interest for chemists, but hopes at least to have removed certain hindrances to the entrance of chemists into this field of study.

Subatomic physics is introduced by a short history of the periodic system, atomic and kinetic theory. The author then lists the principal facts which have led to modern extensions of Dalton's views, and begins his systematic discussion of them with radio-activity. Then follows the action of alpha particles on matter, and the researches on positive rays which have revealed the isotopy of non-radio-active elements and so profoundly influenced our present ideas of the meaning of "an element."

The next chapter deals with x-rays, Moseley's law and the simplified theory of the hydrogen atom as well as the calculation of the constants of Moseley's equation for x-ray emission frequencies. A simple account of "hydrogen-like" spectra introduces the effect of the mass of the nucleus on the motion of the system. In the next chapter the Hamiltonian equations are employed and permit a more general statement of the quantum conditions; then follow elliptical orbits, Stark and Zeemann effects and the relativity mechanics. In the last chapter the reader learns of the speculations of Kossel, Bohr, Stoner and Swinne, concerning the ordering of the non-nuclear electrons. V. M. Goldschmidt's geochemical ideas are mentioned. The treatment follows Sommerfeld in most respects but the material is greatly restricted and simplified. The condensation is excellently done. The reviewer was disappointed not to find more on the nature of non-hydrogen-like spectra, magnetic properties, and also some account of the ion-lattice theory of crystals.

NORRIS F. HALL

Colloids: A Textbook. By H. R. KRUYT, Professor of Physical Chemistry, University of Utrecht. Translated from the Manuscript, by H. S. VAN KLOOSTER, Professor of Physical Chemistry, Rensselaer Polytechnic Institute, Troy, N. Y. John Wiley and Sons, Inc., 440 Fourth Avenue, New York City, 1927. xi + 262 pp. 116 figs. 23.5 × 15.5 cm. Price \$3.50.

The author states that his purpose is "to offer a main line of orientation to students who wish to become acquainted with the general trend of colloid chemistry, or who desire to undertake research in this particular branch of chemistry." This purpose has been attained for the most part in so far as his limited space allows. The treatment is divided into four sections; General Methods, Suspensoids, Emulsoids, Special Cases. The treatment of suspensoids is quite the conventional one, although not all of his readers will agree that the dyeing of wool is an example of reversible adsorption and that fastness of dyed fabrics to washing depends upon adsorption equilibrium (p. 38). Langmuir's views on adsorption are questioned on page 28 and adopted on page 103.

In the treatment of emulsoids the author differs sharply from Loeb's ideas. An emulsoid sol consists of particles surrounded by a film of water which protects them against flocculation, chiefly by hydration. The protein emulsoid sols also possess an electrical double layer, one constituent of which originates in the particle itself. The Donnan equilibrium is presented in the usual way and a theory of gelatinizing is presented in considerable detail. Soaps are considered as colloids intermediate between suspensoids and emulsoids. McBain's theory of the ionic micelle is considered superfluous. The colloidal soap particle consists probably of salt molecules, only those on the outside being ionized and taking part in the electrical double layer.

The translator deserves the highest commendation for his skill in rendering a foreign language into English. This task has been accomplished with the complete elimination of foreign idiom, so that the text as presented reads as if it were originally written in English.

E. B. MILLARD

Einführung in die Chemie der Polymeren Kohlenhydrate: Ein Grundriss der Chemie, der Stärke, des Glykogens, der Zellulose und anderer Polysaccharide. (Introduction to the Chemistry of Polymeric Carbohydrates: An Outline of the Chemistry of Starches, Glycogens, Cellulose and other Polysaccharides.) By P. KARRER, Professor at the University, Zürich. Akademische Verlagsgesellschaft m.b.H., Leipzig, 1925. ix + 285 pp. 21.5 × 15 cm. Price, bound, 16 Mk.; unbound, 13 Mk.

In this treatise the author gives a critical review of recent work on the chemistry of starch, glycogen, cellulose and related polysaccharides.

The seven chapters comprise (1) starch, (2) glycogen, (3) lichenin, (4) cellulose, (5) inulin, (6) chitin and (7) other polysaccharides (pentosans, hexosans).

The topics are treated throughout from the physico-colloidal standpoint, and views of other workers are reviewed critically and impartially.

The author's valuable personal contributions to this field are well known and it is this intimate, personal contact which has enabled him to portray with remarkable clarity and originality the properties of these natural compounds and the intimate relationship existing between them.

The volume can be heartily recommended to all workers in the field of polysaccharide chemistry.

HAROLD HIBBERT

Problems in Organic Chemistry. By H. W. UNDERWOOD, JR., Ph. D., Instructor in Organic Chemistry, Massachusetts Institute of Technology. McGraw-Hill Book Company, Inc., 370 Seventh Avenue, New York, 1926. x + 233 pp. 21 × 14 cm. Price, \$2.00.

Far too large a part of the instruction in science in our colleges and universities consists in filling the minds of students with facts which they are expected to remember. It is much more important that they should be taught to use the facts at their command and the knowledge available in textbooks and handbooks in a constructive way. This is particularly true of organic chemistry. The facts of the science are almost unlimited in number and the most conscientious student can retain only a few in his memory. As our author well says, "Descriptive questions which involve merely a restatement of the material in textbooks or lecture notes have little or no value in teaching students how to master the principles of the subject and apply them to concrete cases."

Dr. Underwood's book is well adapted to remedy this defect in the ordinary teaching of organic chemistry. In each of the twenty-four chapters after the first two a brief statement is given about the characteristics and nomenclature of some class of organic compounds and, in nearly all, there are charts showing the most important relations to other classes of compounds. Then follow numbered paragraphs, each containing from one to eight or ten problems or questions. The distinction between problems which the student should be able to solve from his knowledge of the subject and questions which involve detailed knowledge to be found in textbooks or handbooks is not kept as clear as it might have been and some of the paragraphs resemble a quiz-compend rather than genuine problems. The design of the book is certainly very excellent and it will prove very useful both to students and teachers.

The question might be raised, of course, whether such problems would not find their place better in a comprehensive textbook of organic chemistry but so long as the textbooks in common use do not provide such problems, such a book is timely.

In reading the discussions of nomenclature, one is impressed with the chaotic state of the subject and it would have been well if the author

had paid closer attention to the principles followed by *Chemical Abstracts*, the best authority we have in English. Nomenclature is, after all, a matter for authority and not for the exercise of personal idiosyncrasies.

It may not be out of place to remark that the exact atomic weight of carbon, 12.005, is quite unnecessary in calculating the analyses of organic compounds. The factor 3/11 for the carbon of carbon dioxide is sufficiently accurate even for very accurate determinations. Even the value 1.008 is scarcely necessary for hydrogen. If 1 is taken for hydrogen and 1/9 of the weight of water found is taken as the weight of the hydrogen found, two errors which very nearly compensate each other are introduced and the results are well within the errors of ordinary analyses.

W. A. NOYES

A Text-Book of Organic Chemistry. Historical, Structural and Economic. By JOHN READ, Professor of Chemistry, University of St. Andrews. G. Bell and Sons, Ltd., London, 1926. xii + 680 pp. 87 figs. 19.5 × 13 cm. Price, 12s. 6d. net.

"The treatment of the subject has been stripped of a good deal of detail which is often included in a preliminary account, but which is here replaced by other matter illustrating in broad outline the scope of organic chemistry, its position as a link between physical and biological science and its industrial and economic interest. In accordance with the same principle, the chemistry of the fats, carbohydrates, proteins and other important natural groups has received an unusual prominence in the scheme of presentation. These readjustments of emphasis have been effected with little compunction, in the belief that a beginner in organic chemistry should be encouraged to utilize his available time and energy in obtaining a comprehensive view of the science and in absorbing its spirit and general principles, rather than in 'learning' lists of specialized reactions and inter-relationships."

The reviewer has had the book on his desk an inordinate time—certainly long enough to give it a very thorough reading. All of the book has not been read. However, enough of it has been read to warrant the following observations. It is an excellent book, one of the best of its kind; it is unusually free from typographical errors, and the format is good.

Undoubtedly many in this country will object to giving the first 60 pages to an historical development of chemistry. Few will deny that these early chapters are interestingly presented. The author in his preface makes a good pedagogical case for the inclusion of the historical matter. It is not an overly serious matter if all the students do not read all of the historical development at this stage of their training. There would still be left a large number of pages of excellent material.

HENRY GILMAN