Experimental proof of the foregoing statements will be presented in detail in an early paper.

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NEW BOOKS

Radiations from Radioactive Substances. By SIR ERNEST RUTHERFORD, O.M., D.Sc., Ph.D., LL.D., F.R.S., JAMES CHADWICK, Ph.D., F.R.S., AND C. D. ELLIS, Ph.D., F.R.S. The Macmillan Company, 60 Fifth Ave., New York, 1930. xii + 588 pp. 138 figs. 16 × 24 cm. Price, $6.50.

From its appearance in 1913, Rutherford's "Radioactive Substances and Their Radiations" became the English classic of radioactivity. Unfortunately, for the past few years it has been out of print and a new edition has been eagerly awaited. Its place is taken by the present volume, with a change of title and of authorship.

The new title expresses a real change of subject matter. While the earlier work constituted a complete treatise of radioactivity, to have retained the same scope of subject and the same readable style of presentation would have necessitated a book of at least two large volumes. Instead of assuming such an undertaking, the authors elected to limit the present text principally to the nuclear changes and their accompanying radiations.

There are ample reasons to justify this change of policy. The genetic relationships of the radioactive elements and their relationships to the periodic system have not altered greatly since 1913 and may be regarded as a practically completed subject, while the future of radioactivity and the possibility of all evolutionary processes of matter lies in the nucleus. The only possibility of gaining direct information about the highly important structure of the nucleus is by means of the rays and particles which it emits and by its behavior under suitable radiation or bombardment by electrons or alpha particles. It is to the consideration of these topics that the book is devoted with unusual appropriateness, since it was Rutherford who blazed the way to and into the nucleus.

The most recent progress in the structure of the nucleus has been through the application of quantum ideas and of wave mechanics to the energy and wave lengths of the emitted radiations. The interrelationships that have come from the more exact studies of optical and magnetic spectra give indications of a definite and comprehensible nuclear structure. Certainly no co-authors could have been found more competent to write on beta radiation than Dr. Chadwick nor on gamma rays than Dr. Ellis,

both of whom have contributed so much to a better understanding of their origin.

The authors should be congratulated on their success in retaining the very lucid and felicitous style of the earlier work which to the reviewer seemed to set a new standard of scientific literary style.

The book consists of eighteen chapters divided with fair equality between alpha, beta and gamma radiations. In the eighteenth chapter, a number of miscellaneous topics are discussed, among others, the preparation of standard radium solutions. Great stress is laid on the addition of acid but with no mention of "protective barium" which is perhaps even more important than acid. The inclusion of parts of the earlier work and omission of others has necessarily led to some inequalities of treatment; for example, leaving a discussion of the relation of helium to the age of minerals, but omitting the more important Pb:U ratio.

Needless to say, every worker in radioactivity will wish to have this valuable treatment of the subject at his disposal. The figures and printing are good and the cost of but a cent per page is to be recommended to other publishers.

S. C. LIND

Applied Inorganic Analysis with Special Reference to the Analysis of Metals, Minerals and Rocks. By Dr. W. F. HILLEBRAND, Late Chief Chemist, U. S. Bureau of Standards, and G. E. F. LUNDELL, Chemist, U. S. Bureau of Standards. John Wiley and Sons, Inc., 440 Fourth Ave., New York, 1929. xix + 929 pp. Illustrated. 15.5 × 23.5 cm. Price, $8.50.

Part I discusses the interpretation of results, the balance and weighing, apparatus and reagents with especial attention to the dangers of contamination from these sources, the manipulations of quantitative analysis with descriptions of suitable apparatus, the preparation of material for analysis, group separations with the treatment of the group precipitates, certain special operations and volumetric analysis. Part II, which comprises more than half the book, deals with the separation and determination of the elements, both metallic and acidic, common and rare, with special attention to the purity and definiteness of the products. Parts III and IV describe the analysis of silicate and carbonate rocks, and are essentially a revision of Bulletin 700 of the Geological Survey. Part V is devoted to the analysis of glass and refractories.

Although this book gives so comprehensive a survey of a large portion of the field of gravimetric and volumetric analysis that information covering any ordinary contingency is sure to be found within its covers, its value lies fully as much in the critical attitude of the authors in recognizing the difficulties and limitations which an analyst meets on every side. The high standards for which Dr. Hillebrand first became known while Chemist

of the Geological Survey have been fully maintained by the junior author in the portions of the book for which he is responsible.

Abundant references to original sources of information constitute a particularly valuable feature, while numerous tables are used to exemplify the conclusions and for informatory purposes.

It is not too much to say that no text has been published which is so instructive in the art of analysis as this one, and that no analytical laboratory can afford to be without it.

GREGORY PAUL BAXTER

Theoretische Grundlagen der organischen Chemie. (Theoretical Principles of Organic Chemistry.) Vol. II. By WALTER HÜCKEL, Professor at the University of Greifswald. Akademische Verlagsgesellschaft m. b. H., Schlossgasse 9, Leipzig C 1, Germany, 1931. iv + 352 pp. 11 figs. 16 × 23.5 cm. Price, unbound, M. 18; bound, M. 20.

In this volume[1] Professor Hückel deals with the relation of constitution to physical properties on the one hand and to reaction velocity on the other. The greater mathematical tractability of the physical results is reflected in the 2:1 ratio of pages in "Books" 3 and 4. A thorough understanding alike of the implications of the newer physics and of the facts of organic chemistry makes the volume valuable alike to organic chemists who wish to know the bearing upon their science of the recent developments in physics, and to physicists whose preconceptions as to organic chemistry have been undermined by the strategic retreat of Heisenberg.

A well-constructed index is divided into three parts: name, subject and chemical compounds—the last giving references also to the first volume. The proportion of non-German references is higher than in many German textbooks—but one looks in vain for references to articles in the *Physical Review* or the *Journal of Physical Chemistry*.

The reviewer regrets that the bearing on organic chemistry of the Debye and Hückel theory of strong electrolytes is not considered; that the knowledge of the ampholytic character of the amino acids displayed on p. 187 has not prevented a reference on p. 282 to the decrease of acid dissociation constants by the "positive" amino group; that on p. 215 free fall has been taken as the mechanical analog of chemical reaction, instead of motion in a fluid viscous enough to make kinetic energy negligible; and that the appreciation of the need for clearer thought about valence shown in the closing chapter on the "Theory of so-called preëmption of valence or affinity" has not led to different symbols for the charge distributions in benzene and in betaïne.

ELLIOT Q. ADAMS

[1] For a review of Volume I, see L. F. Fieser, THIS JOURNAL, **53**, 3570 (1931).

Analyse und Konstitutionsermittlung organischer Verbindungen. (Analysis and Constitution Determination of Organic Compounds.) By Dr. HANS MEYER, Professor of Chemistry in the German University at Prague. Verlag von Julius Springer, Linkstrasse 23–24, Berlin W 9, Germany, 1931. xx + 709 pp. 180 figs. 17 × 26 cm. Price, unbound, RM. 48; bound, RM. 51.

The fifth edition of this book is divided into three parts: I (236 pages), purification and criteria of purity of organic substances, elementary analysis and determination of molecular weights; II (50 pages), determination of the parent structure; III (387 pages), qualitative and quantitative determination of organic groups (functional groups). A part of the fourth edition devoted to the qualitative and quantitative determination of the more important degradation products has been omitted. This is to be expanded and to appear as a separate publication. A considerable reduction in size has been effected in the fifth edition owing to some extent to the deletion of older methods and of details for the preparation of reagents but largely due to the use of a more concise style of presentation and the omission of many equations and structural formulas. The condensation has been done judiciously and does not impair the usefulness of the book. The literature references have been carried through March, 1931.

The section dealing with elementary analysis includes a detailed description of the conventional methods as well as the newer semi-micro methods. Although various micro methods are cited, the reader is referred to Pregl's "Mikroanalyse" for details concerning them. The compilation of methods for determining elements that occur less frequently in organic combination (boron, fluorine, etc.) is particularly useful.

The brief part devoted to determination of the parent structure is so concisely treated that it appears to be a list of reagents and reactions, with appended examples. This part is useful chiefly as a bibliography of the three topics discussed: oxidative degradation, alkali fusion and reduction.

More than one-half of the book is given to the qualitative and quantitative determination of organic groups, and is a careful and reasonably complete compilation of methods in these fields. Each group of compounds is taken up under the headings, qualitative detection and quantitative determination. The first of these enumerates the reactions of various classes of compounds within each group and the second discusses the particular reactions that have been used for quantitative work. Although practically all of the reagents employed for the preparation of derivatives for qualitative identification are discussed, tables of physical constants are not included. No systematic procedures for qualitative identification of pure individual substances or for analysis of mixtures are discussed.

This book is an excellent reference work on specific procedures for qualitative and quantitative analysis. It contains excellent bibliographies and is provided with a good index. Although it is written primarily for ad-

vanced students and research workers, it will also prove useful as a reference book for intermediate students in qualitative and quantitative organic analysis.

JOHN R. JOHNSON

Memorie e Comunicazioni Scientifiche (1894–1930). (Collected Works and Scientific Papers (1894–1930).) By Prof. Dott. CESARE SERONO, Lecturer in Chemistry and Clinical Microscopy, University of Rome. Instituto Nazionale Medico Farmacologico Serono, Via Casilina 125, Sede Centrale Roma (139), Italy, 1931. xi + 701 pp. 19 × 27 cm.

It is always a great convenience to have the scientific contributions of an investigator collected in a single place, particularly when on the one hand they have appeared in scattered and frequently inaccessible periodicals, and on the other hand are finally presented in so compact and elegant a form as the present volume.

ARTHUR B. LAMB

Organic Chemistry for Students of Pharmacy and Medicine. By A. H. CLARK, Ph.G., B.Sc., M.S., Professor of Chemistry, University of Illinois School of Pharmacy. D. Van Nostrand Company, Inc., 8 Warren St., New York, 1929. ix + 446 pp. 14 × 22 cm. Price, $3.50.

For the purpose of review this book can be considered in two sections. The first, parts 1 and 2, is the usual elementary textbook of organic chemistry. The second, part 3, gives the chemical formulas of the more important synthetic medicaments. This section, which represents considerable labor on the part of the author (for much of the information is not easily accessible), is valuable to the research worker in Pharmacology rather than to the ordinary student.

The qualification of the title of such textbooks, "for students of . . ." always gives one to think. It is not justified by mere mention of proteins and other complex biological products. Nor is there any special organic chemistry for pharmacy or medical students. On the contrary such qualification appears associated almost invariably with the omission or defect of that very aspect of theoretical organic chemistry which is fundamental to pharmacy and medicine, namely, the careful discussion of the behavior of such typical groupings as —OH, —CHO, —NH_2, etc., and their influence upon each other in complex substances. The student does not need a knowledge of the total formula of any substance but he should know the significance of active groupings, for only then will he realize how a substance will behave in the compounding of a prescription or on introduction into living tissues. Apart from such knowledge of behavior there is no more value in organic chemistry than would be found in the memorizing of a table of logarithms.

JOHN H. FOULGER