

## NEW BOOKS

**General Chemistry. A Text-book for College Students.** By JOSEPH A. BABOR, Assistant Professor of Chemistry, College of the City of New York. Thomas Y. Crowell Company, 393 Fourth Avenue, New York, 1929. x + 586 pp. 167 figs. 14.5 × 22.5 cm. Price, \$3.75.

This book has been written for the use of college students who have had a preparatory course in chemistry. With this background in mind the author has left out some of the descriptive material usually found in elementary text-books of chemistry. The distinctive feature of the text is the extensive application of the principles of atomic structure, which is introduced early in the course. In the preface the author states that "Not only is the concept introduced, but constant use is made of it throughout the course, for atomic structures furnish the tools with which to study the chemical properties of the elements. Before the properties of an element are discussed the atomic structure of that element is studied and compared with the atomic structures of other elements in the same family, and the chemical properties of the element in question are predicted." The author accordingly uses a large number of diagrams to illustrate atomic structures and all oxidation-reduction equations are treated from the point of view of the electronic changes. This has been well done and will make a strong appeal to many teachers of chemistry.

The discussions of some of the topics considered by many as essential parts of a course in general chemistry are omitted altogether or treated very briefly. While some of this material may have been included in the secondary school course in chemistry that is required for the user of this book, this is not always the case, at least in the average high school. For example, in view of the general and increasing importance of dispersed systems, it seems a pity to limit the discussion of this subject to less than one page.

Considerable space is given to a rather detailed and well presented discussion of the dissociation theory but no mention is made of the important modifications in this theory which have resulted from the work of Bragg and of Debye and Hückel.

The following statement on page 113 will be questioned by many: "We have learned that molecular oxygen is inactive but that atomic oxygen acts readily. It is possible that the water vapor causes dissociation of some molecules of oxygen into atoms, or produces a weakening of the non-polar bonds of the molecule. Such atoms or weakened molecules react. The same explanation is offered for the activity of chlorine."

The book is well printed and attractively bound, the proof reading has been carefully done, and the illustrations are excellent.

JAMES H. WALTON

**Laboratory Manual in General College Chemistry.** By JOSEPH A. BABOR, Assistant Professor of Chemistry, College of the City of New York, and ALEXANDER LEHRMAN, Instructor in Chemistry, College of the City of New York. Thomas Y. Crowell Company, 393 Fourth Avenue, New York, 1929. viii + 376 pp. 34 figs. 14.5 × 22.5 cm. Price, \$2.00.

This manual, which is written for use with Babor's General Chemistry, contains 142 experiments on some of the more fundamental theories and the commoner metals and non-metals and their more important compounds. The directions are clear and sufficiently detailed and each experiment is preceded by a discussion of the topic under consideration. The intelligent performance of these experiments should give the student a good comprehension of the fundamentals of elementary chemistry.

JAMES H. WALTON

**Thermodynamik. (Thermodynamics.)** By W. SCHOTTKY, H. ULICH and C. WAGNER. Julius Springer, Berlin, Germany, 1929. xxv + 619 pp. 90 figs. Price, paper cover, M. 56; bound, M. 58.8.

The three authors, one a theoretical physicist with strong engineering interests, the other two physical chemists, have written the most complete modern textbook on thermodynamics I know of. The subjects treated are the ones of most interest to the chemist, while purely engineering examples (internal combustion engine, *e. g.*) are scarcely mentioned.

The book uses chiefly the method of thermodynamic functions, which grows more and more common at present, but explains also the older methods. Furthermore, it has the great advantage of giving as standard values for energy and particularly entropy the ones referred to room temperature, as used in this country, as well as the ones referred to the absolute zero as used in Germany, so that the student can read papers of both kinds easily. In accord with G. N. Lewis' procedure, the authors introduce a number of newly defined quantities to make each step in the calculations clearer, by dividing the work necessary to perform a complicated process into standardized parts. While in the long run the result will probably be a clarification, it makes the book not easy to read.

In general, the characteristic features of the book are: a very thorough discussion of the fundamental assumptions, mainly considered in the first third of the book. The authors are not afraid to transgress occasionally beyond the limits set to thermodynamics by the purists. In this part they encounter the familiar difficulty of saying exactly what is meant by "molecule" in the condensed states. Instead of using this concept, they introduce the more general "resistant group" that might or might not coincide with it.

In the remaining two-thirds the authors proceed to the chemical applications. In this part are especially notable: the most thorough and detailed discussion of the chemical constant of ideal gases, and the influence

of the "Statistical weight" upon it, which includes the latest results of the new quantum mechanics; a short presentation of the geometric methods, inaugurated by Gibbs and at present usually only found in books by Dutchmen, the scope of which is usually limited in other directions; detailed methods to be applied in reactions of non-ideal gases.

Finally, there is a treatment of equilibria with general solid phases which bridges a gap found in all other books. One is accustomed to give actual formulas for reactions in a gas and in solution, but if solids enter (apart from the simple case of pure solids, as in simple evaporation, dissolution and so on), one has to use the more qualitative statements of the phase rule and diagrams. This textbook is the first which tries to give actual formulas in these cases also. It thus starts a development which will, it may be hoped, make the equilibria with solids, which are of the highest technical importance (metallurgy!) as completely subject to calculation as the gases are now. The last sixty-four pages are devoted to numerical examples.

My main objection is that the prominence they merit is not given to the results of Stern's paper on the statistical foundations of the theory of solutions, which is far too little known, but which made the general theory clear for the first time.

If, finally, we compare this book with Lewis and Randall's well-known work, a comparison which arises naturally, I would say that Lewis and Randall could be compared to an automobile map, showing the highways in a clear and pleasant manner and leading the man who wants to get quickly to the big cities in an almost foolproof way. The present book is a mountain map, destined for the man who does not mind climbing over rather rough and desert country and spending much time over it and who enjoys it. Such a map is almost confusing in its details, but it shows how to get anywhere, including spots which are visited only very seldom.

KARL F. HERZFELD

**A Concise Summary of Elementary Organic Chemistry.** By FREDERICK HURN CONSTABLE, M.A., D.Sc. (London), F.I.C., Fellow of St. John's College, Cambridge. E. P. Dutton and Company, Inc., 286-302 Fourth Avenue, New York, 1929. xii + 149 pp. 13 × 19 cm. Price, \$2.00.

The character of this book is indicated adequately by the title; it presents the essential facts of elementary organic chemistry in the form of an outline, and it is intended for the use of the student preparing for an examination. The book "tabulates series of compounds, giving their formulas; physical properties; the general methods of preparation; and the general reactions of the series. Finally, special examples of each series are described." It has been prepared carefully and the information given is well

arranged and usually accurate. The only serious errors discovered consist in the writing of esterification as an irreversible reaction and in defining condensation, in connection with aldol formation, as an irreversible process.

If properly used, the new book should be an aid to the student in systematizing his information; but, since it emphasizes fact to the practical exclusion of theory, there is considerable danger that it will tend to lead the student to neglect the broader aspects of the subject. The student is expected to acquire from other sources a knowledge of general structural theory and the relationships between the different series; the limits of reactions, the reasons for the conditions required for bringing them about, and their application in syntheses. The present outline, however, hardly encourages this type of studying. The implication given is that, in preparing for an examination, an acquaintanceship with a large number of facts is more desirable than a thorough understanding of relatively few principles. The reviewer, on the other hand, has a partiality for the kind of examination which would be exceedingly difficult for the student whose knowledge of organic chemistry consisted solely in having memorized Dr. Constable's "Summary."

LOUIS F. FIESER

**An Introduction to Modern Organic Chemistry.** By L. A. COLES, B.Sc. (London), A.I.C., Senior Chemistry Master, Batley Grammar School. Longmans, Green and Co., 55 Fifth Avenue, New York, 1929. xv + 452 pp. 78 figs. Illustrated. 13.5 × 20 cm. Price, \$2.50.

This is a book for the student of high school or preparatory age who intends from the start to specialize in chemistry. Since in this country organic chemistry is seldom offered at this early stage in the student's training, the book can be evaluated only in terms of its suitability for use in our colleges. While it cannot be dismissed on the ground that it is too elementary for this purpose, it would be a difficult book to use in most institutions because of the unusual method of presentation adopted by the author.

The student's introduction to the new science is by way of the laboratory. He first prepares ethyl alcohol from sugar, without knowing anything about the structures of these compounds, and he then proceeds to prepare nearly all of the simple derivatives and oxidation products of the alcohol. He performs qualitative analyses and molecular-weight determinations with these compounds and learns how they may be analyzed quantitatively. After completing a similar experimental study of acetic acid, and a total of thirty-one experiments, he is at last given a chance to consider what it is all about. Then, with a few promptings from the author, he sees that he has already "discovered" the structures of the compounds with which he has been working. The second and third sections of the book present the essential facts about the aliphatic and aromatic compounds in more or less orthodox

fashion, though the descriptive and theoretical matter is combined with laboratory experiments. The final chapter outlines the history of the science.

While the author is to be congratulated for the skill with which he has developed the idea of the purely experimental approach to learning, one questions the soundness of this policy. The advantage which may derive from familiarizing the student with a number of organic compounds before he commences the study of their structures is offset by the harm that may be done in teaching him to follow instructions which he cannot understand thoroughly. In launching the student into such a flood of laboratory work, the author also seems to be aiming at the ideal of having the student learn for himself. No one can quarrel with this excellent principle, but, unfortunately, it is not very practical. The student eventually has to be told almost everything, and it is only giving to the so-called experiment an illusory value to withhold some of the information available until after its completion.

The book is clearly written, the experiments are usually well planned, and the method of presentation is certainly novel. On the other hand, there are no special features which adequately justify the term "modern" in the title. This only tempts the reviewer to be over-critical and to point out that some of the apparatus described, as well as the systematic nomenclature, does not conform to the best current practice. A more serious charge is that no emphasis has been placed on the importance of unsaturation in organic chemistry. The double bond is first discussed on page 256, and there is very little mention of the activating influence of unsaturated groups in either the aliphatic or the aromatic series. The student will perhaps observe that the groups which are usually meta-directing, and which render benzene-substitution more difficult, are all unsaturated, but this is not called to his attention.

LOUIS F. FIESER

**Les Essences Naturelles. Extraction—Caractères—Emplois.** (The Natural Essences. Extraction—Characteristics—Uses.) By PROFESSOR CALISTO CRAVERI, translated from the second Italian Edition by HENRI TATU. Dunod, 92, Rue Bonaparte (VI), Paris, France, 1929. xi + 602 pp. 57 figs. 14 × 21.5 cm. Price, unbound, 70 fr.; bound, 80 fr.

In the preface to this volume the author states his purpose to be the presentation of a manual of a practical nature, containing definite and precise information, exact figures, clear and conscientious advice and not to include material of a theoretical, hypothetical and polemical nature. The translator remarks that Mr. Craveri's work contains in a single volume the essentials of what is found in the largest works on the subject.

The book is divided into eight chapters, including general properties, physical and chemical characteristics of constituents, general methods of

extraction, purification and preservation, general methods for the separation of constituents, concentration and deterpenation, general methods of analysis and classification of essences.

While the work intentionally subordinates the theoretical to the practical, too great condensation of chemical information is liable to lead to erroneous conclusions on the part of the reader, as, for example, the statement on page 48 that menthocitronellol is prepared artificially by the reduction of 1-menthone. As a matter of fact this transformation involves the preparation of at least four intermediates with a breaking of the ring structure.

This is an excellent manual on the subject of essential oils, and the impression gained from reading it is that the author has well accomplished his object as stated in the preface. A few typographical errors were noted, particularly in English and German synonyms, as in the misspelling of peppermint, tansy, myrtle and rainfarn.

E. K. NELSON

**The Chemistry of Leather Manufacture.** BY JOHN ARTHUR WILSON, D.Sc., Chief Chemist, A. F. Gallun and Sons Corporation; President, American Leather Chemists' Association. Volume II, second edition. American Chemical Society Monograph Series. The Chemical Catalog Company, Inc., 419 Fourth Avenue, New York, 1929. 685 pp. Illustrated. 15.5 × 23.5 cm. Price, \$10.00.

The second volume of Dr. Wilson's outstanding contribution to the science and practice of leather making has been written with the same care and vigor as Volume I. The book is unique in its field for several reasons: it is the most comprehensive treatise on the subject; it covers the practical side in a simple expository manner, ignoring the many cook-book recipes once so popular in technological writings in the leather field; it gives a clear, concise and complete exposition of the latest known pure science foundations of the practical operations and materials, weaving the latter into the discussion of the manufacturing practice, and includes the fullest discussion now extant concerning the physical and chemical properties of different kinds of leather. The last named information has been created almost entirely through the author's own efforts.

The 29 chapters of the book include the following subjects: vegetable, chrome, alum, iron, oil, aldehyde, quinone, syntan and the rarer tanning processes; oil emulsions; fat liquoring; dyeing and finishing, including varnishes and lacquers; furs; microsectioning and microscopic technique; the physical and chemical properties of leather and methods of analysis. It is richly illustrated with photomicrographs, containing 59 plates on heavily sized paper and 159 figures.

This volume joins Volume I as an indispensable part of the library of leather chemists and tanners and will be found exceedingly useful to all chemists.

ARTHUR W. THOMAS