

rapidly run onto the precipitate which dissolved with a momentary red color, forming after a few seconds a colorless solution. This is strong evidence that the color change was not due to oxidation but to polymerization.

Reduction of Benzylpyridinium Chloride.—A solution of 2 g. of benzylpyridinium chloride in 50 cc. of water was treated with 50% more than the amount of vanadous chloride equivalent to two hydrogen equivalents. No precipitate formed but the vanadous chloride was evidently oxidized, as the first portion of it rapidly changed color. The solution was made strongly alkaline and the solution containing a suspension of inorganic hydroxides and organic material was repeatedly extracted with ether. On evaporation a brown solid was obtained which on washing with alcohol became nearly white. It melted at 74–83° and was identified as *N,N'*-dibenzyl-tetrahydro-dipyridyl by the very characteristic blue color which its alcoholic or acetone solutions acquired when warmed in air.⁷

Summary

1. Vanadous chloride reduces triphenylpyrylium chloride, forming a colored substance insoluble in water that behaves like a free radical. The same reagent reduces phenylxanthylium chloride to the free radical, phenylxanthyl, previously prepared by Gomberg.

2. Triphenylcarbinol in concd. hydrochloric acid or sulfuric acid solution is reduced to triphenylmethyl by vanadous chloride.

3. Xanthenol in concd. hydrochloric acid is reduced by vanadous chloride to bixanthylium. The color of the product indicates that a free radical is first formed which is stable only in the solid state. Benzylpyridinium chloride is reduced to a bimolecular product; no insoluble compound is formed in contrast to the behavior of the oxonium and carbonium chlorides.

CAMBRIDGE 38, MASSACHUSETTS

NEW BOOKS

The Theory of Allotropy. By A. SMITS, Ph.D., Professor of Chemistry in the University of Amsterdam. Translated from the German with the Author's sanction by J. SMEATH THOMAS, D.Sc., Senior Lecturer on Chemistry in the University of Liverpool. (Text-Books of Physical Chemistry, edited by Sir William Ramsay and F. G. Donnan.) Longmans, Green and Company, 55 Fifth Avenue, New York; London, Toronto, Bombay, Calcutta and Madras; 1922. xiii + 397 pp. 239 figs. 22 × 14 cm. Price \$7.00 net.

Many of the writers of scientific papers published in the Netherlands seem tacitly to assume that the reader is thoroughly familiar with the writer's previous papers and can therefore without explanation apprehend the precise meaning of terms and symbols. In a series of papers this may be unavoidable, but a book made from them should surely include a fundamental discussion comprehensible to the reader not already a specialist in the topic. American readers of this book will find the explanatory matter inadequate, and the general mode of treatment is not attractive enough to persuade many of them to proceed far with the task of reading

it comprehendingly. Part of the difficulty is inherent in the subject; but the drier the subject, the more care must one take in exposition. The first two pages are designed to set forth the basis of the theory, but do it so curtly that to many readers they would convey little. On the third page the author plunges into his subject and devotes about half of the book to a theoretical discussion of various possible cases, using the methods of Gibbs, which are more familiar to Hollanders than to Americans. In the latter half he takes up a number of cases which have been investigated experimentally and considers the application of the theory to account for electrochemical phenomena, passivity of metals in particular. The essence of the theory is that allotropy is a case of tautomerism; that an allotropic substance, though in many respects it behaves as a one-component system, is in reality a mixture of two molecular species or pseudo-components which in general are in equilibrium with each other. This hypothesis is very helpful in accounting for the phenomena observed in systems such as sulfur where the observed melting temperature, for instance, depends upon the previous history of the sample of sulfur; but there is a question as to how far one is practically justified in extending it to all of the cases to which the author applies it. To the student specifically interested in the subject of allotropy the book will be welcome, but it cannot be commended to any other class of readers.

JOHN JOHNSTON

Anorganische Chemie: ein Lehrbuch zum Weiterstudium und zum Handgebrauch.
(**Inorganic Chemistry: a textbook for the more advanced student and for reference.**)

By Dr. FRITZ EPHRAIM, Professor at the University of Berne. Second and third editions, revised. Theodor Steinkopff, Residenzstr. 12 b, Dresden-Blasewitz, 1923. viii + 742 pp. 55 figs. 24.5 × 16.5 cm. Price unbound \$2.00; bound \$2.40.

It is not surprising that a third edition of this excellent handbook has been required. In it, account has been taken of the most recent advances in this field, and numerous minor improvements have been made. The book is, however, substantially unchanged from the first edition.

It is too bad that so good a book as this is printed on such miserable paper.

ARTHUR B. LAMB

Laboratory Exercises in Inorganic Chemistry. By JAMES F. NORRIS, Professor of Organic Chemistry, Massachusetts Institute of Technology, and KENNETH L. MARK, Professor of Chemistry, Simmons College. International Chemical Series, H. P. Talbot, Ph.D., Consulting Editor. McGraw-Hill Book Company, Inc., 370 Seventh Avenue, New York; 6 and 8 Bouverie Street, E. C. 4, London, 1922. x + 548 pp. 16 figs. 21 × 14 cm. Price \$2.00.

This book is intended for "the student who has had a good training in Chemistry in the high school, and who should have his interest stimulated

in his college course, and should be given an opportunity to extend his experience." In carrying out this purpose, the authors have avoided the mere repetition of the more purely illustrative experiments performed in the high school, and have introduced a large number of experiments to emphasize the general principles of chemistry, as the following titles of the first 20 experiments will show.

Physical and Chemical Changes; Mixtures and Pure Substances, (an important topic often slurred in elementary courses); Oxygen; Hydrogen; Quantitative Studies of Chemical Reactions; Water; Chlorine; Hydrochloric Acid; Hydrogen Peroxide; Properties of Liquids and Solids; Carbon and Its Compounds; Acids, Bases, and Salts; Solutions; Chemical Equilibrium; Sulfur and Sulfides; Oxides and Acids of Sulfur; Nitrogen and the Atmosphere; Ammonia; Acids and Oxides of Nitrogen; Atomic and Molecular Weights. The experiments which follow take up Groups 7 and 5, organic compounds, silicon and boron, and then the metals, but include also experiments on the physical properties of the metals, chemical properties of the metals, and electrochemistry. Each assignment is preceded by a discussion which should enable the student to understand the general purpose of the experiments. The experimental directions are clear, and involve simple apparatus.

The most striking feature of the book is the list of questions upon each experiment. The authors have resisted the temptation to do all the thinking for the student by wording the questions so as to indicate the answer. The questions are, on the contrary, well calculated to stimulate the student to accurate observation and clear reasoning. In the opinion of the reviewer, this course represents a noteworthy effort to give the student the proper foundation for the understanding of modern chemistry.

JOEL H. HILDEBRAND

Die Physikalische Chemie in der Inneren Medizin (Physical Chemistry as Applied to Internal Medicine). By Prof. Dr. H. SCHADE, Director of the Physico-chemical Division of the Medical Clinic, University of Kiel. Theodor Steinkopff, Dresden and Leipzig. 1921. vii + 569 pp. 107 figs.

The development of physical chemistry as an independent entity has determined great progress in many fields of thought. Among these, the medical sciences upon which the art of healing is based, have been notably stimulated and expanded by the application of these concepts and generalizations. Recognizing the import of scientific development to the practice of the art, the author has prepared a non-mathematical summary for the use of physicians and students. The introductory chapters are devoted to an exposition of certain fundamental concepts in the physico-chemical field. In the main the facts are clearly presented, at times, excellently, and the summary solution of certain of the still disputed questions of theory will probably not prove disquieting to the author's prospective

clientele. As an example may be cited the author's opening sentences (p. 2) in which solutions are divided into three "sharply defined" types. From time to time, the author pauses to emphasize the validity of purely materialistic concepts. One wonders why his optimistic prophecy concerning cell morphogenesis is not supported by quotation from Bastian's ingenious—and meaningless—experiments. The major portion of the volume is concerned with the principal thesis, the pathological conditions discussed being arranged chiefly in a topographical classification. The blood, alimentary canal, liver, kidneys, lungs, circulatory and nervous systems, are among the topics treated. It is to be regretted for the authority of the book that the access of the writer to literature other than that in German, was so limited. While the disruption of the war could readily explain a number of the omissions, others cannot be so reasonably condoned. To cite a single instance, a discussion of gaseous metabolism without reference to Benedict or duBois must fall short of a complete exposition of the topic. Of the author's own prolificity, frequent quotation leaves no doubt. Particularly is he indebted to his earlier publication on "The Significance of Catalysis for Medicine."

Certain earlier generalizations which have lost a portion of their original significance in the light of later experience are apparently regarded as still to be designated as laws ("gesetze").

In the somewhat frequent application of this term to generalizations of varying degrees of validity one is inevitably reminded of the Dooley saying of two decades ago concerning "buildings called sky scrapers—but not by the sky."

A third portion of the book is devoted to a description of the technical details of certain physical chemical methods which have been applied to diagnostic procedures. Many of the illustrations are familiar to those who have had occasion to consult the catalogs of several well-known purveyors of apparatus.

To summarize briefly: the book shows evidence of the expenditure of much labor. There is, however, a distinct lack of critical evaluation of much included material. With the several excellent treatises in this field from authors evidencing a more catholic taste in current literature there does not seem to be a searching need for the present volume.

The make-up of the book reflects the material difficulties with which Germany is now contending.

A. W. ROWE

Die Physikalische Chemie in der Inneren Medizin. Die Anwendung und die Bedeutung Physikochemischer Forschung in der Pathologie und Therapie für Studierende und Aerzte. (Physical Chemistry as Applied to Internal Medicine. The Application and Significance of Physicochemical Studies in Pathology and Therapeutics. For Students and Physicians.) By Prof. Dr. H. Schade. Third enlarged

and revised edition. Theodor Steinkopff, Dresden and Leipzig, 1923. viii + 605 pp. 120 figs. 24.5 × 16 cm. Price unbound \$2.80; bound \$3.70.

While the preceding review was in press, a third and revised edition of the work has appeared. Beyond the expansion of certain sections by the inclusion of more recent citations, chiefly local in origin, no significant changes have been made. A number of minor inaccuracies occurring in the first edition remain uncorrected. The insertion of the index to Part I in the body of the book is an innovation of dubious value. The quality of press work and stock is improved but still leaves much to be desired.

A. W. ROWE

Practical Physiological Chemistry. By PHILIP B. HAWK, M.S., Ph.D., Professor of Physiological Chemistry and Toxicology in the Jefferson Medical College of Philadelphia. Eighth edition, revised. P. Blakiston's Son and Co., Philadelphia, U. S. A., 1923. xvi + 693 pp., 6 full page color plates and 197 figs. Price \$5.00.

Since the first appearance of this work in 1907, it has passed through a number of editions until in 1923, the 8th revision appears. Originally intended as a laboratory manual, it has grown steadily until it is now a somewhat compendious compilation of laboratory methods. This growth, while it has enriched the volume as a work of reference has, in large measure, nullified the original purpose. A patent cause of the embarrassment of riches is the attempt to unite in one volume the materials for a course in biochemistry suitable for collegiate instruction, with those of a diagnostic technical character designed for the instruction of medical students. The chapters on "Gastric Analysis" and "Respiration and Acidosis" are eminently cases in the latter point. This enlarges the book far beyond any practical compass as a teaching manual, and entails a repetition of early experiments under later captions.

In the chapter on "Metabolism" it is a little difficult to understand the inclusion of 20 pages of animal experimentation, although the lucidity of the text and the attractiveness of the illustrations make it both interesting and stimulating. It is to be regretted also that in the selection of analytical methods the author does not exercise a larger measure of critical scrutiny, thereby lessening the somewhat bewildering multiplicity of procedures for the determination of a single substance. To summarize, in its present form the book occupies that debatable middle ground between the real laboratory manual designed for the conduct of a specific course, and the encyclopedic compendia of laboratory methods such as so frequently appear under the editorship of the prolific Abderhalden.

On the other hand, the book possesses many admirable qualities. The introductory paragraphs of each chapter are most judicious summaries of the facts and theories to illustrate which the experiments are designed. The author enjoys a most happy faculty of presenting his matter with clarity, simplicity and accuracy. These qualities, applied as they are to

the individual directions for experiment, offer the maximum of assistance to the student, while in no sense restricting individual performance. The illustrations are numerous and admirably chosen. The summaries in systematic form cannot fail to appeal to teacher and student alike. The appendix, repeating the directions for preparation of reagents and solutions, originally presented as footnotes, is an excellent feature. The index is complete and well arranged.

If the author could be persuaded to divide his material into two volumes, thus conserving the needs of his dual public, the objections to the present text would be in large measure eliminated. And teachers and students in the several fields of pure and applied biochemistry would be greatly enriched thereby.

From the publisher's standpoint the book is handsomely and durably fashioned. Freedom from typographical error is an added attraction.

A. W. ROWE

The Chemistry of Tuberculosis. By H. GIDEON WELLS, M.D., LYDIA M. DEWITT, M.D., and ESMOND R. LONG, Ph.D., Professors in the University of Chicago and in Rush Medical College. Williams and Wilkins Company, Baltimore, U. S. A., 1923. vii + 447 pp. 7 figs. 23.5 × 15.5 cm. Price \$5.00, United States; \$5.25, Canada; \$5.50 other countries; net, postpaid.

This volume is the outgrowth of the bibliographical phase of the studies on tuberculosis carried out at the Otho S. A. Sprague Memorial Institute. The authors state in the preface that it supplements the earlier monograph by Ott published in 1903. They could with full justice have claimed that, in large measure, it replaces it. The majority of citations are from the literature of the last two decades, during which time refinement and development of chemical methods have rendered obsolete much of the carefully compiled but regrettably erroneous data of the earlier period. The application of physicochemical concepts and generalizations to the problems of biology has also wrought changes of far reaching import and significance. In the present volume, while the cited literature is by no means exhaustive, this is evidently the result of a nice discrimination. Particularly to be commended is the just and balanced use of the authors' own material.

Pertinent and significant reference is naturally made, but there is wholly lacking that textual absorption that is an unfortunate and limiting feature of certain similar publications. Recognizing the existence of two schools of practice, it may be suggested that the uniform inclusion of the author's name with the literature citation would be an improvement. Further advantage might be secured by an alphabetical arrangement of all citations in an appendix.

The book is divided into unequal thirds, each dealing with a special phase of the topic. The introductory chapters on the chemistry of the

acid fast bacteria are written by Dr. E. R. Long. The chemical composition of the bacillus and its various metabolic activities are fully treated, and a special chapter is devoted to the property of acid fastness. The second section, which comprises approximately half of the volume and deals with a discussion of the chemical changes in the host, is from the pen of the senior author. Readers who have enjoyed the succinct and graphic summaries in the author's "Chemical Pathology" will derive equal pleasure from the present volume. Restatement of citations is here and there observed, but a fresh connotation usually warrants the repetition.

The inclusion of brief but lucid comparisons and contrasts with pathological states other than that of the thesis adds to the value of the book to the general scientific reader, and attests quietly and convincingly the author's breadth of perspective.

The concluding chapters of the book, written by Dr. L. M. DeWitt, deal with the chemotherapy of tuberculosis. As is implied in the character of research to which the Sprague Institute is dedicated, citation from local sources is here more frequent. With its intrinsic connection with the problem in hand, however, it but emphasizes the scope and value of the studies which have there found their genesis.

All in all, the authors have rendered a very real and definite service to the scientific public, for while the individual worker must go to his original sources, the summary here critically presented, should make unnecessary many hours of fruitless labor.

Mechanically, the press work is excellent, and there is an almost complete absence of typographical error. The probable appearance of a new edition in the near future will, it is hoped, offer opportunity for the use of a more substantial binding.

A. W. ROWE