

potency of approximately 27 μg . per g. of the original liver powder. The chick thus appears to utilize the substance about four times as efficiently as *L. casei*, probably because of partial hydrolysis in the intestinal tract.

The substance is readily adsorbed by charcoal at pH 1 but not at pH 9 and only partially at pH 4.5. It is slowly extractable by ether from strongly acid solutions and from preliminary tests appears to be precipitated by lead acetate. It is stable at pH 1 for at least forty-eight hours at 37° , but a sample lost 77% of its potency on autoclaving in 0.5 *N* hydrochloric acid for one hour at 15 pounds pressure. It has been found not only in liver, but also in yeast, vitab, cheese and eggs. The amount present varies from a trace to more than half of the original total pantothenic acid activity. Attempts to isolate the substance are in progress.

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A. L. NEAL
F. M. STRONG

RECEIVED JULY 19, 1943

CRYSTALLINE NATURAL α - AND γ -TOCOPHEROLS

Sir:

In a recent paper the purification of natural α -, β -, and γ -tocopherols was described.¹ Further investigation has shown that natural α - and γ -tocopherols thus purified can be crystallized.

(1) Baxter, Robeson, Taylor and Lehman, *THIS JOURNAL*, **65**, 918 (1943).

Synthetic *d,l*- α -tocopherol (Merck) was also converted to a solid but amorphous state. This note describes the method of crystallization and certain properties of the crystalline products.

α -Tocopherol (0.5 g.) in methyl alcohol (20 cc.) was cooled to -35° and scratched occasionally with a glass rod. After eight to ten days the tocopherol crystallized in transparent needles, m. p. 2.5 – 3.5° . The extinction coefficient of the crystals in ethyl alcohol ($E_{1\text{ cm.}}^{1\%}$, $292\text{ m}\mu = 71$) was slightly but not significantly lower than that of uncrystallized α -tocopherol ($E_{1\text{ cm.}}^{1\%}$, $292\text{ m}\mu = 73.7$).¹ This provides additional evidence of the purity of the latter.

Crystalline γ -tocopherol, obtained by the same procedure, consisted of clumps of transparent needles which melted at -3 to -2° and had $E_{1\text{ cm.}}^{1\%}$, $298\text{ m}\mu = 93.2$. Uncrystallized γ -tocopherol had $E_{1\text{ cm.}}^{1\%}$, $298\text{ m}\mu = 92.8$.¹ Therefore, the extinction coefficient of γ -tocopherol was also unchanged significantly by crystallization.

Synthetic α -tocopherol (Merck) was obtained as a white amorphous solid when cooled to -35° in methyl alcohol solution and seeded with natural α -tocopherol crystals. It melted to a light straw colored oil at about 0° and had $E_{1\text{ cm.}}^{1\%}$, $292\text{ m}\mu = 70$.

Attempts to crystallize natural β -tocopherol were unsuccessful.

CONTRIBUTION NO. 49 FROM THE LABORATORIES OF
DISTILLATION PRODUCTS, INC.
755 RIDGE ROAD WEST
ROCHESTER, NEW YORK

CHARLES D. ROBESON

RECEIVED JULY 19, 1943

NEW BOOKS

Dictionary of Biochemistry and Related Subjects. Editor-in-Chief, WILLIAM MARIAS MALISOFF, Professor of Biochemistry at the Polytechnic Institute of Brooklyn. Published by Philosophical Library, Inc., 15 East 40th St., New York, N. Y., 1943. 579 pp. 15.5×23.5 cm. Price, \$7.50.

The intention of the Editor-in-Chief in compiling this work is expressed in the preface as follows: "The Dictionary of Biochemistry is a pioneering effort in an entirely new field. There have been no previous dictionaries of this kind. Furthermore, the concept of a "dictionary" has been changing from that of a mere alphabetical glossary to something resembling an encyclopedia. . . . The dictionary contains a great deal of glossary material and also

a great deal of fairly lengthy authoritative discussion. It tries to maintain a balance between obsolescent, established, and newly explored material. It is designed for readers of biochemical literature who might want the definitions of terms used more than a decade ago as well as of terms just coined. There was no intention of replacing textbooks or abstract or review journals, except insofar as certain items are greatly neglected or are not easily available."

One will find in this volume about ten thousand definitions of biochemical terms. In addition, there are short articles on various topics by forty-six collaborators. Among these collaborators, one will find the names of many leading investigators in the medical sciences. Some of the

topics covered by these articles are: Autolysis, Bacteriophage, Bioluminescence, Digitalis Glycosides, Gastro-Enterology, Growth, Hair, Permeability, Photosynthesis, Plant Growth Hormones, Biochemistry of Psychiatry, Phosphate Bond Energy, Wound Healing, etc. Each article is five to fifteen pages in length and is concluded with a list of references which, in one case, numbers ninety.

In order to test the volume as a dictionary, the reviewer selected what he considered to be twenty-two of the less well known subjects indexed in the *Journal of Biological Chemistry* for the year 1940. Four of the twenty-two subjects were not defined in the dictionary. These four terms are glucuronidase, ketosteroid, mycolic acid, phytic acid. The process was repeated using the 1934 edition of Bodansky's textbook, "Introduction to Physiological Chemistry." Out of forty-six terms selected, the following four were not defined: aldobionic acid, cyprinine, phaseolin, viginin. The dictionary will obviously not give the expert all the definitions for the more uncommon terms. One will find, however, definitions for barnacles, mumps, liver, and fuzz, to mention a few that struck the reviewer's eye. There are a few definitions which the reviewer ran across which he felt were inadequate. For example, dissociating proteids are defined as "Enzymes which are conjugated proteins which contain a prosthetic group." This statement made the reviewer curious as to how cozymase, which might be listed as the prosthetic group of a dissociating proteid, would be defined. Cozymase is erroneously defined as "a mononucleotide of molecular weight about 350."

The paper employed in this volume by the publisher does not look as if it were capable of withstanding the hard use usually given dictionaries. There appear, however, to be very few typographical errors.

The Editor-in-Chief is to be congratulated for his courage in attempting to produce this volume during these times. His attempt to produce a hybrid between a dictionary and an encyclopedia will no doubt be met with varying reactions. The student of biochemistry and workers from neighboring fields will undoubtedly be grateful; the expert in the field of biochemistry will probably be highly critical.

ERIC G. BALL

Outlines of Physical Chemistry. By the late FREDERICK H. GETMAN. Seventh Edition. By FARRINGTON DANIELS, Professor of Chemistry in the University of Wisconsin. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y., 1943. xii + 691 pp. 166 figs. 15.5 × 23.5 cm. Price, \$3.75.

In the preface Professor Daniels states: "The present revision involves rearrangement, the addition of more advanced material, particularly in the first part of the book, the inclusion of new developments in physical chemistry, and a somewhat different approach to thermodynamics and to the phase rule. Mathematical operations and practical applications are emphasized with the help of frequent examples." These remarks admirably summarize the revision and the reviewer will merely attempt to amplify them.

The first four chapters deal successively with Funda-

mental Concepts, Gases, Crystals and finally Physical Properties and Molecular Structure. They closely resemble chapters I, II, IV, and V of the previous edition and differ mainly due to the deletion of material concerning the heat capacities of gases and of solids. This material forms part of the next chapter, a new one, on Heat, Work and Heat Capacity. This chapter contains a discussion of the First Law of Thermodynamics with some familiar applications and follows the usual manner of presentation to be found in texts on thermodynamics. The sixth chapter is devoted to Thermochemistry and is followed by a chapter that includes the Second Law of Thermodynamics along with discussions of Entropy and Free Energy. Most of the material contained in these three chapters on thermodynamics was present in the former edition but was widely distributed through the text. Collected together they form a good elementary presentation of thermodynamics which appears to have greatly influenced the revision of subsequent chapters. The eighth chapter is concerned with Liquids and the topic is approached from the secure foundation of thermodynamics without undue emphasis on the dubious relationship of the liquid to either gas or solid. Starting now with solutions the remainder of the text follows the order of presentation of the former edition. Individual chapters have been revised, wherever necessary, in order to utilize the thermodynamic approach. It is the opinion of the reviewer that the new order of presentation constitutes an improvement and also that the infusion of thermodynamics has been accomplished without overdoing it. The former chapter on Electrolysis and Polarization has been eliminated by distributing its subject matter among other chapters.

Numerous examples have been included to illustrate calculations, uses of formulas, choices of units and other details of application. Some of these were formerly a part of the text. They are now set off in small type so that they may be ignored while reading and thus reserved for later detailed study. This practice improves the continuity of the text and is an important clarification of presentation. It should be greatly appreciated by the student.

Many recent advances have been incorporated into the text. Again, the more complicated mathematical derivations have been relegated to an appendix. Somewhat better reproduction of photographs has been achieved and in general the proportions of figures seem to have been improved.

The new edition should continue to enjoy the popularity of its predecessors and will undoubtedly win new admirers.

R. S. HALFORD

Potash in North America. By J. W. TURRENTINE, Ph.D., President American Potash Institute (Formerly in charge of Potash Investigations, U. S. Dept. of Agriculture). American Chemical Society Monograph Series. Reinhold Publishing Corporation, 330 West 42nd St., New York, N. Y., 1943. 186 pp. 62 figs. 15.5 × 23.5 cm. Price, \$3.50.

No last word can ever be said or written about advancing science and technology. That is, of course, axiomatic, and clearly points to the need for another book on Ameri-

can potash now. In 1926, when Dr. Turrentine previously wrote about this subject, potash production in the United States was largely, but not entirely, abandoned. The feverish demand for this essential growing out of World War I had failed to provide an industry capable of surviving the vicissitudes of peace. Hence, the previous book attempted to salvage for future use as much of value as possible from what then were largely ruins.

If that volume partook of the nature of a dirge, the present one is a paean of accomplishment. For, in the intervening period, not only has the American potash industry grown to stature, but it has emerged from the test of a second World War fully mature. The steps in that growth are reviewed by one who has been intimate with each of them. The uses of potash are discussed and summarized statistically both for the United States and for the world. The technology of present production is given in considerable detail with generous quotations from published papers of those responsible for the several important enterprises forming the industry. Especially interesting is the fact that phase rule studies provide the basis on which this industry is built, thus emphasizing again the vital role of pure science in an extremely practical pursuit.

D. H. KILLEFFER

Textbook of Biochemistry. By BENJAMIN HARROW, Ph.D., Professor of Chemistry, City College, College of the City of New York. Third Edition, Revised. W. B. Saunders Company, West Washington Square, Philadelphia, Pennsylvania, 1943. ix + 537 pp. Illustrated. 16 × 24 cm. Price, \$4.00.

It must take courage these days, as well as a wide knowledge of the subject, to write a book covering practically all phases of animal biochemistry. This has been done in 25 chapters. At the end of each chapter Harrow gives a well-chosen list of references. An appendix at the end of the book deals with the nutritive values of foods. The up-to-date character of this third edition is one of its most valuable qualities. It differs from earlier editions in being considerably more comprehensive. While possibly a little difficult for students of home economics, the volume should suit medical students perfectly. The subject index is satisfactory and the contents of the 25 chapters are well arranged.

The book is rather free from typographical errors. Some of the errors are: (p. 9) hezopyranose, (p. 23) Schweitzer, (p. 224) benzyamine formula, (p. 405) gm. instead of mg. No serious misstatements are in the book. Some relatively unimportant remarks which are open to challenge are: "Some enzymes, at least, are probably proteins." This occurs on page 2 and similar remarks are made on pp. 23, 52, 99 and 105. By this time, surely, we know that probably all enzymes are proteins. In speaking of rennin (p. 224) Harrow does not make it clear that rennin is found only in the calf and not in the young of other species. He states (p. 267) that since Svedberg found hemoglobin to have a molecular weight of 66,800 it might mean that four molecules of hemin are present. The reviewer thinks that there is no doubt of this. Much more than 10 lines might be profitably devoted to the subject of rancidity (p. 35). Harrow notes that the term "hematin" is the cause

of endless confusion and defines it as a reduced compound. The reviewer considers "heme" to be a more confusing term even than "hematin" and has employed the term "hematin" for 30 years as a ferric compound.

In summation, Harrow's third edition of "Textbook of Biochemistry" is recommended to all teachers and students as an outstanding piece of work. It deserves to be used extensively and to be placed in all chemistry libraries.

JAMES B. SUMNER

Organic Chemistry. By WILLIAM T. CALDWELL, Temple University. Houghton Mifflin Company, 2 Park Street, Boston, Mass., 1943. x + 763 pp. 16 × 24.5 cm. Price, \$4.25.

An excellent and stimulating exposition of organic chemistry. While this text contains a wealth of material that may be somewhat embarrassing to the beginner and will require careful teaching, it is well written, accurate and concise. The arrangement follows pretty well the usual pattern, although the author has not hesitated to use unconventional reactions to illustrate his point. The material is thoroughly up-to-date and well organized. Included in the thirty-eight chapters are such headings as electronic formulas, proteins, alicyclic compounds, terpenes, sterols and related substances, heterocyclic compounds, alkaloids, and literature of organic chemistry. No questions appear at the end of each chapter or elsewhere. The printing is well done and the pages are easy on the eye.

D. E. WORRALL

BOOKS RECEIVED

June 10, 1943–July 10, 1943

STEPHEN BRUNAUER. "The Adsorption of Gases and Vapors." Volume I. "Physical Adsorption." Princeton University Press, Princeton, N. J. 511 pp. \$7.50.

R. E. BURK and OLIVER GRUMMITT, *Editors*. "The Chemistry of Large Molecules (Frontiers in Chemistry, Vol. I)." Interscience Publishers, Inc., 215 Fourth Avenue, New York, N. Y. 313 pp. \$3.10.

JAMES MURRAY LUCK, *Editor*. "Annual Review of Biochemistry." Volume XII, 1943. Annual Reviews, Inc., Stanford University P. O., California. 704 pp. \$5.00.

FRANK H. MACDOUGALL. "Physical Chemistry." Revised Edition. The Macmillan Company, 60 Fifth Avenue, New York, N. Y. 722 pp. \$4.25.

GEORGE HOLMES RICHTER. "Textbook of Organic Chemistry." Second Edition. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y. 759 pp. \$4.00.

R. H. WRIGHT. "Manual of Laboratory Glass-Blowing." Chemical Publishing Co., Inc., 234 King Street, New York, N. Y. 90 pp. \$2.50.