We wish to report that within the last two years we have carried out the reduction over nickel catalyst (Raney) of the esters of α-aminoacids to the corresponding alkamines. The reaction was successfully carried out on the esters of leucine ethyl ester, of aminophenylacetic acid ethyl ester and of phenylalanine ethyl ester. In the case of the ester of *l*-leucine and of *levo*-phenylaminoacetic ethyl ester, the alkamines were obtained in active form. Depending on conditions of the reaction, it was possible to obtain from the ester of phenylaminoacetic acid either 2-phenyl-2-aminoethanol, or 2-cyclohexyl-2-aminoethanol. Under still other conditions it was possible to obtain from the esters corresponding secondary amines. Also, condensation to piperazine takes place over nickel (Raney) catalyst. The primary and the secondary amino groups may remain unsubstituted or alkylated, depending upon conditions of the reaction.

In the present note we report the analytical data of the alkamines only. The smallest yield of the active leucinol is 40% of the theoretical and the smallest yield of the phenylaminoethanol is 60%. The yields undoubtedly could be improved on working with larger quantities.

PROPERTIES AND ANALYSES

Ethyl ester	*d,l*-Leucine	*l*-Leucine	*levo*-Phenyl-amino-acetic acid	*d,l*-Phenyl-amino-acetic acid
$\alpha^{25}D$ (hom. 1 dm.)	..	+9.75°	−70.5°	..
t, °C.	135	70	40	40
p (initial), atm.	150	150	150	150
Duration, hours	24	9	9	18
Product	$C_6H_{15}ON\cdot HCl$	$C_6H_{15}ON$	$C_8H_{11}ON$	$C_8H_{17}ON$
$(\alpha)^{25}D$ (in CH_3OH)	..	+1.9°	− 5.61°	..
Carbon, % Calcd.	46.87	61.47	70.02	67.07
Carbon, % Found	47.19	61.59	69.86	67.30
Hydrogen, % Calcd.	10.5	12.90	8.09	11.96
Hydrogen, % Found	10.3	12.84	8.27	11.77

THE ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH
NEW YORK, N. Y.

G. OVAKIMIAN
MARTIN KUNA
P. A. LEVENE

RECEIVED FEBRUARY 16, 1940

NEW BOOKS

Ausführliches Lehrbuch der organischen Chemie. (Comprehensive Textbook of Organic Chemistry.) Vol. II. By WILH. SCHLENK. Verlag von Franz Deuticke, Helferstorferstrasse 4, Wien I, Germany, 1939. xvii + 896 pp. 11 figs. 17.5 × 26 cm. Price, RM. 30; bound, RM. 33. (Vol. I, now RM. 30; bound, RM. 33.)

This second volume of a contemplated three, the last of which according to the author will appear soon, covers the chemistry of the carbocyclic aromatic compounds. The first volume, published in 1932, was devoted to aliphatic chemistry and the third presumably will describe the heterocyclic compounds.

This publication when complete will be the most extensive modern textbook in organic chemistry available in any language. About 1600 pages have been consigned to aliphatic and aromatic chemistry. Since this work approaches more closely than any other the "Lehrbuch der organischen Chemie" by V. Meyer and P. Jacobson, a comparison is pertinent. Both works are presented in essentially the same style. Meyer and Jacobson, however, include a multitude of original references and devote much space to a description of the physical and chemical properties not only of the basic compounds but of their more important derivatives. Schlenk omits these and consequently is able to include in considerably less space the same amount of textual material. This publication, thus, becomes more literally a textbook from which a reader may acquire many of the important facts about any class of organic compounds, organic theories or mechanisms of reaction. It is not intended as a reference work for the investigator. In view of the ever-broadening scope of organic chemistry, Schlenk's plan appears to the reviewer to be the more feasible since the research man must of necessity search the original literature; such a text as this will supply him with general information about any class of compounds with which he happens to be less familiar.

Each class of aromatic compounds is systematically discussed. The theoretical considerations are correlated with the description of those substances which have been studied most in developing a theory or mechanism. Thus, the theories on the orientation of substituents introduced into the benzene nucleus are given in the chapter on benzene and its simple derivatives; the Fries rearrangement under the discussion of phenol esters and ethers; restricted rotation under biphenyls and the use of oxidation–reduction potentials under quinones, etc. The theoretical discussions are concise and give the reader sufficient information to understand the subjects.

These three volumes should serve admirably as an advanced text of organic chemistry for the student who is beyond the first year of study in this subject as well as for the research man who always requires general reading

in fields outside of his specialty if he is to retain his breadth of knowledge in organic chemistry. They should be a valuable addition to chemical libraries especially to those which are limited in scope. Beyond a text like this, the organic chemist must use monographs, advanced books on special topics or the original literature.

The material presented is entirely up-to-date. The book is well printed, readable and contains a minimum of typographical errors. It can be recommended highly to the organic chemist.

ROGER ADAMS

A Text-Book of Quantitative Inorganic Analysis. Theory and Practice. By ARTHUR I. VOGEL, D. Sc. (Lond.), D.I.C., F.I.C. Head of Chemistry Department, Woolwich Polytechnic: Lately Beit Scientific Research Fellow of the Imperial College. Longmans, Green and Company, 114 Fifth Avenue, New York, N. Y., 1939. 856 pp. Illustrated. 14.5 × 22.5 cm. Price, $5.00.

The author states, in his preface, that this book is designed as a text of quantitative inorganic analysis, theory and practice, to meet the needs of University and College students preparing for the various higher examinations in British universities and colleges.

Besides an appendix of data, the book consists of six chapters, on the theory of quantitative analysis, on experimental technique, and on volumetric, gravimetric, colorimetric and gas analysis. The chapter on theory appears to be adequately presented, the material including topics which are similarly treated in other modern texts on the subject. Emphasis is naturally on solutions. Chapter 2 on technique, has to do with apparatus, reagents and operations. The four chapters on analytical methods are unusually complete for a book of this type and really give it the character of a reference book. For instance, there are four methods given in detail for determining fluorides, and ten for antimony, to mention merely two cases taken at random. One more chapter, on quantitative calculations, particularly in volumetric analysis, would save much repetition in discussing volumetric methods.

References to the literature are not frequent and when given are by author and year without the journal reference, which is inconvenient for the reader. The very full cross-references in the book are to chapter, section and paragraph, with no page number given, which is so inconvenient as to be irritating. This system is an old one, but fortunately most writers have discarded it. There is the same tendency in this book as in many others to consider that the one consideration in analysis is accuracy and that time is not a factor. For instance, in igniting a precipitate with its filter paper, the student is told (p. 272) that it usually takes about twenty minutes to char the paper, and from thirty to sixty minutes to complete an ignition. Again in determining a sulfate as barium sulfate in a Gooch crucible, the student is told (p. 482) to ignite the precipitate for periods of fifteen minutes until constant weight is obtained. These, however, are all minor points. Taken as a whole, the author has produced a very good book indeed, and it will be useful both to beginners as well as to others who use it as a work of reference.

H. W. FOOTE

Physikalische Methoden der analytischen Chemie. Dritter Teil. (Physical Methods of Analytical Chemistry, Vol. III.) Edited by W. BÖTTGER. Akademische Verlagsgesellschaft m. b. H., Leipzig, Germany, 1939. xx + 836 pp. 42 figs. Price, RM. 63; bound, RM. 65.

In this third instalment of Volume III, Professor Böttger, the Editor, has brought the presentation of the whole subject up to date; first, by supplementary chapters covering the fields already discussed in Volumes I and II of this handbook which appeared in 1932 to 1936 and, second, by the addition of further chapters devoted to new physical methods of analysis which have arisen or have become important in the interim.

To the first group belong the chapters on Spectroscopic Analysis, Chemical Analysis by Means of X-Rays, Conductometric Titration, Applied Conductivity, Polarographic Analysis and Potentiometric Analysis. To the second group belong the chapters on chromatographic analysis, as applied both to organic and inorganic chemistry, the rapid analysis of inorganic compounds, particularly metals, by vaporization, analysis by means of Raman spectra and photometric methods of analysis.

The supplementary chapter on Polarographic Analysis consists of a complete bibliography of the new publications in this field between 1936 and 1938. The other supplementary chapters present unified and up-to-date discussions of their particular fields. The chapter on Potentiometric Analysis (282 pages) by Professor Böttger is especially thorough, illuminating and complete.

The chapters on the newer fields are, of course, particularly interesting. The striking results obtained by chromatographic analysis, the simple and rapid separation of metals from complicated alloys and minerals by evaporation, and the rapidity with which Raman rays have been utilized for analytical purposes are certainly impressive and inspiring.

The book will not only interest chemists in general but it will be very useful to those specializing in the fields which it discusses.

ARTHUR B. LAMB

Kurzes Lehrbuch der physikalischen Chemie. (Brief Textbook of Physical Chemistry.) By Prof. Dr. KARL JELLINEK, Emeritus Professor at the Technical Institute of Danzig. Heft 2 (Volume 2). N. V. Uitgevers-Maatschappij AE. E. Kluwer, Deventer, Holland, 1939. xii + 292 pp. 149 figs. 29 tables. 16 × 25 cm. Price, 7.50 Dutch fl.

Part 1 of Professor Karl Jellinek's 4-part brief, elementary textbook of physical chemistry already has been reviewed (THIS JOURNAL, **61**, 1298 (1939)). The present paper-bound section is Part 2 of the text; Parts 3 and 4 are promised for publication soon.

The same fine tone of clear explanation which characterized Part 1 is maintained here; and again the author presents a very extensive and helpful set of problems which are worked out in the body of the text as a part of the exposition. The subject matter is broken down in the different chapters and classified in a highly sub-divided, and quite logical, outline. An idea of the broader groupings of the discussion may be obtained from the following list:

Electrochemistry—A. General properties of solutions of electrolytes; B. Phenomena connected with reversible electrode potentials; C. Chemical equilibria in electrolytes; D. Chemical equilibria in fused salts; Phase Rule—A. Systems containing a single substance; B. Binary systems; Colloid Chemistry—A. Uncharged boundary surfaces; B. Electrically charged surfaces; C. Systems of abnormally large surface area; D. Formation of new phases; Chemical Kinetics—A. Homogeneous systems; B. Heterogeneous systems; C. Irreversible electrode potentials, and electrode reactions.

EDWARD MACK, JR.

A Textbook of Inorganic Chemistry for Colleges. Second edition. By JAMES F. NORRIS, Professor of Organic Chemistry, and RALPH C. YOUNG, Assistant Professor of Chemistry, Massachusetts Institute of Technology. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York, N. Y., 1938. x + 803 pp. 33 figs. 14.5 × 21 cm. Price, $3.75.

Inorganic Chemistry by Norris and Young is a well written and, for undergraduate work, a fundamental and comprehensive treatise of the subject. The tabulation of properties of the elements and compounds at the beginning of each chapter is a distinct improvement, in that it saves space and gives at a glance the information desired. The book, to my mind, is somewhat lacking in drawings and illustrations of commercial processes, which, I think, tends to increase interest.

J. P. SIMMONS

Physiological Chemistry. A Text-Book for Students. By ALBERT P. MATHEWS, Ph.D., Andrew Carnegie Professor of Biochemistry, The University of Cincinnati. Sixth edition. The Williams and Wilkins Co., Mount Royal and Guilford Avenues, Baltimore, Maryland, 1939. xvi + 1488 pp. 113 figs. 16 × 23.5 cm. Price, $8.00.

The sixth edition of Mathews' text-book has been extensively revised and enlarged. The section on practical methods has been omitted; there has been a rearrangement of some of the chapters, and the book has been set in a clearer type. The new typography accounts for an increase in number of pages of approximately 18% over the fifth edition of 1930. A rough calculation suggests that about 350 pages of new text have been added exclusive of the apparent increase due to the resetting.

The book is intended for the use of medical students and of graduate students and, as in earlier editions, the emphasis is placed on the functions of the organs of the animal body. These functions are discussed so far as possible in terms of chemical reaction. The fundamental chemistry of the carbohydrates, lipides, and proteins is described in the first eleven chapters (450 pages), the remaining two-thirds of the book being devoted to the consideration of the body as a mechanism. Blood is dealt with in seven chapters (177 pages), foods and digestion in four (218 pages), and metabolism in three (106 pages). In addition there are chapters on animal heat, brain and nerve tissue, muscle, connective and supporting tissues, skin, endocrine glands, excretions and vitamins.

The material in general is presented from a broad philosophical point of view; there is not too much insistence on details and the relationship of the separate functions to the whole organism is constantly kept before the reader. Nevertheless it is unfortunate that so much discussion from earlier editions, even from the first edition of 1915, has been retained unchanged. Statements that were at one time entirely proper are apt to lead to confusion in the mind of the student when they are placed in juxtaposition to more recently acquired knowledge, and phraseology that would indicate that many of these earlier conclusions have now only an historical significance is usually omitted. The teacher is faced with the task of pointing out to students what is authoritative and new and what has today been superseded.

The chapter on proteins (Chapter X, pp. 294–364) may be used to illustrate the worst features of this book. As a presentation of the present position of our knowledge of the proteins, this chapter is entirely inadequate. The section on nucleic acid and nucleoproteins, which formed a part of the chapter on proteins in earlier editions, now appears, with minor additions, as Chapter VI. Most of what remains in Chapter X has been transferred unchanged from the fourth edition of 1925, and much of this material was written for the first edition of 1915. A comparison page by page with the fourth edition shows that only about 8 pages of new material have been included. The advances in protein chemistry of the last 14 years are thus presumably dealt with in these 8 pages. Study of the text shows, however, that many of the additions consist merely of a sentence added to an older paragraph.

In the discussion of the molecular weight of proteins, Hüfner and Gansser's pioneering osmotic pressure studies of 1907 are fully described but no mention is made of Sörensen's and of Adair's demonstrations of the fundamental errors in this early work although these contributions appeared upward of 20 years ago. The work of Svedberg's laboratory which has appeared since 1926 is dismissed with four lines of text in which the ultracentrifuge is referred to as a super-centrifuge, and the page and a half of new text on molecular weights contains statements some of which contradict those made on preceding pages. No mention is made of modern diffusion methods nor of recent stoichiometric accomplishments and a student might well be left in a state of considerable misapprehension of what is now known of the molecular weights of proteins.

The list of "kinds of amino acids found in proteins" (pp. 310–312), newly prepared for the sixth edition, contains 31 entries. The inclusion in such a list of γ-hydroxy-α-aminobutyric acid (in canavalline), of citrulline, canavanine, prolysine and still more of the betaine ergothioneine is open to grave question. Some of these substances do in fact occur in plant tissues and one has been found in blood. They are related to the protein amino acids in a most interesting way and doubtless have metabolic significance which should be pointed out; but they have not yet been "found in proteins."

The best features of the book may be illustrated by the chapter on vitamins (Chapter XXXIV, pp. 1347–1428).

This has been entirely rewritten for the new edition and contains only about 4 pages of text from the fifth edition. It is complete, authoritative, and for the most part thoroughly accurate. One might question the failure to mention the share that Osborne and Mendel had in the discovery of vitamin A in 1914, particularly when a diagram from their paper is introduced to illustrate statements made about the work of McCollum and Davis that appeared only a few weeks earlier. But this is a minor omission. The chapter as a whole gives the present status of our knowledge of the vitamins clearly and succinctly.

Other chapters occupy an intermediate position. Some, like that on endocrine glands (Chapter XXIX, pp. 1055–1141), have been very extensively revised and enlarged; others, like that on animal heat (Chapter XII, pp. 462, 502), merely contain a few pages of additional material. On the whole, however, it may be said that the task of bringing this edition up to date has been taken seriously and has been performed with a considerable degree of success.

The bibliographies attached to each chapter are well-chosen but are in urgent need of revision. It is a serious defect that no consistent style of abbreviation of journal names is employed in spite of the inclusion of a list of abbreviations on p. xv; for example, seven different ways of expressing the name of THIS JOURNAL were noted. Furthermore, there is no consistency in the order in which volume number, page, and date are presented nor in the typographical style in which the references are classified. Several ambiguous references were found. This is not a good example to students who may one day be faced with the problem of preparing a bibliography in a style acceptable to the editor of a journal.

Mathews' text has long been held in high esteem by teachers and investigators alike as a source of stimulating ideas. It must, however, be read with careful discrimination since speculation on the meaning of various relationships is so frequently introduced. The distinguished author expressed the hope in the first edition that the book would raise more questions than it answered; there seems little doubt that this is still true of the latest edition.

H. B. VICKERY

BOOKS RECEIVED

January 10, 1940, to February 10, 1940

SYDNEY CHAPMAN AND T. G. COWLING. "The Mathematical Theory of Non-uniform Gases." The Macmillan Co., 60 Fifth Avenue, New York, N. Y. 404 pp. $7.50.

EARL C. H. DAVIES. "Fundamentals of Physical Chemistry." Second edition. P. Blakiston's Son and Co., 1012 Walnut Street, Philadelphia, Penna. 447 pp. $3.50.

A. EUCKEN AND M. JAKOB. "Der Chemie-Ingenieur." Band III. "Chemische Operationen." Dritter Teil. "Operationen bei normalem Druck und normaler Temperatur." Akademische Verlagsgesellschaft m. b. H., Sternwartenstrasse 8, Leipzig C 1, Germany. 332 pp. RM. 33; bound, RM. 35.

R. H. FOWLER AND E. A. GUGGENHEIM. "Statistical Thermodynamics." The Macmillan Co., 60 Fifth Avenue, New York, N. Y. 693 pp. $9.50.

ELWOOD D. HEISS, ELLSWORTH S. OBOURN AND C. WESLEY HOFFMAN. "Modern Methods and Materials for Teaching Science." The Macmillan Co., 60 Fifth Avenue, New York, N. Y. 351 pp. $2.50.

G. E. M. JAUNCEY AND A. S. LANGSDORF. "M. K. S. Units and Dimensions and a Proposed M. K. O. S. System." The Macmillan Co., 60 Fifth Avenue, New York, N. Y. 62 pp. $1.00.

OSCAR KNEFLER RICE. "Electronic Structure and Chemical Binding." McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y. 511 pp. $5.00.

HENRY J. SAND. "Electrochemistry and Electrochemical Analysis." Volume I. "Electrochemical Theory." Blackie and Son Limited, 50 Old Bailey, London, England. Distributed in the United States by Chemical Publishing Co., Inc., 148 Lafayette St., New York, N. Y. 133 pp. $2.00.

WALTER A. SHEWHART. "Statistical Method from the Viewpoint of Quality Control." Edited by W. EDWARDS DEMING. The Graduate School, The United States Department of Agriculture, Washington, D. C. 155 pp.

ALBERT V. SZENT-GYÖRGYI. "On Oxidation, Fermentation, Vitamins, Health and Disease." The Williams and Wilkins Co., Mt. Royal and Guilford Aves., Baltimore, Maryland. 109 pp. $2.00.

F. WITTKA. "Moderne fettchemische Technologie." Heft 1. "Verderben der Seifen. Ursachen und Verhütung." Johann Ambrosius Barth, Salomonstrasse 18 B, Leipzig C 1, Germany. 148 pp. RM. 10.

"Gmelins Handbuch der anorganischen Chemie." Edited by E. PIETSCH. 1 Ergänzungsband, Teil 3. "Aluminum Legierungen Patentsammlung." By G. APEL. Verlag Chemie, G. m. b. H., Berlin W 35, Germany. 387 pp. RM. 31.50.

"Gmelins Handbuch der anorganischen Chemie." Edited by E. PIETSCH. "System-Nummer 68: Platin." Teil C, Lieferung 1. "Verbindungen bis Platin und Wismut." Verlag Chemie, G. m. b. H., Berlin W 35, Germany. 140 pp. RM. 16.50.

"Gmelins Handbuch der anorganischen Chemie." Edited by E. PIETSCH. "System-Nummer 68: Platin." Teil A, Lieferung 3. "Darstellung der Platinmetalle." Verlag Chemie, G. m. b. H., Berlin W 35, Germany. 119 pp. RM. 14.25.

"A List of the Books, Bulletins, Journal Contributions and Patents by Members of Mellon Institute, 1911–1938." The Mellon Institute, Pittsburgh, Penna. 242 pp.