Somewhat similar results were obtained by heating the di-urethan with alcoholic ammonia under pressure at 100°.

The quantity of urethan isolated was only 20% of the theoretical, but it probably indicates the main trend of the reaction, since urea, biuret and cyanuric acid may be formed through the medium of urethan.[10]

2. Action of Ethylamine.—The di-urethan in 33% aqueous ethylamine after standing for four hours at room temperature gave, contrary to expectations, allophanic ester in 75% yield. On longer standing the yield was diminished. In twenty-four hours only 30% of allophanic ester was obtained, and in seventy-two hours the ester had completely disappeared. The clear solution was evaporated in a vacuum, and a residue of oil and crystals was left. The oil was taken up in chloroform and, on being fractionated, yielded a portion boiling at 174–175° which was identified as ethylurethan, $C_2H_5NH\text{-}COOC_2H_5$. The crystalline material contained urea and a substance melting at 155° which was not identified.

Some experiments were made on the action of diethylamine on oxalyl- and malonyl-di-urethans in alcoholic solution at 100°. After removal of the alcohol by evaporation oils were obtained which, on being fractionated, invariably gave urethan as one of the products. The other products have not yet been identified.

Summary

1. The decompositions of oxalyl-, malonyl and phthalyldi-urethans by ammonia, ethylamine and aniline have been studied, and the strong tendency for urethan groups to be detached by ammonolysis noted.

2. A comparison with the decomposition of carbonyldi-urethan by the same reagents is made and the different results are indicated.

3. It is suggested that the mode of decomposition of acyldi-urethans is strongly influenced by the nature of the acyl radical. The tendency for urethan groups to be detached may be correlated with a tendency toward the formation of amides of the stronger acids in preference to formation of amides of carbonic acid.

Saskatoon, Saskatchewan, Canada

NEW BOOKS

General Chemistry. Theoretical and Descriptive. By Thomas P. McCutcheon, Ph.D., Professor of Inorganic Chemistry, University of Pennsylvania, and Harry Seltz, Ph.D., Assistant Professor of Physical Chemistry, Carnegie Institute of Technology. D. Van Nostrand Company, Inc., 8 Warren St., New York, 1927. x + 415 pp. 33 figs. 22.5 × 14 cm. Price $3.50.

According to the authors the advantages of the division of general chemistry into two parts, theoretical and descriptive, are:

"Firstly, the student will have at hand a concise and orderly summary of chemical facts, emphasizing the natural groupings and relationships of the elements from the standpoint of the Periodic Law.

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[10] Werner, "The Chemistry of Urea," Longmans and Co., New York, 1923, Chaps. 3, 4 and 7.

"Secondly, the student will have available chapters on each of the essential topics of theoretical chemistry, each complete in itself, and free from diverting and irrelevant matter.

"Thirdly, the instructor will have a maximum opportunity to inspire and interest his students by injecting his own method and personality into the course."

A syllabus of lectures is given to suggest a way in which the theoretical and descriptive matter may be combined.

The first 162 pages include all the theoretical material generally included in a text of this kind, and the treatment is excellent. For the sake of brevity, the authors have included almost no historical matter and there are no lists of references in the text. Problems are given at the end of several of the chapters.

Descriptive chemistry, covered in part two, takes up first the more common non-metals, with chapters in order on acids, bases and salts; water, ozone and hydrogen peroxide; valence, equations, nomenclature; and preparation of metals and metallic compounds—classification of salts. The remainder of the elements are taken up in their periodic groupings with a brief discussion of family resemblances at the head of each chapter. It seems to the reviewer that the authors have here missed an opportunity to make their radical treatment really effective. Our modern ideas of atomic structure permit predictions of variations in properties of compounds of elements in the same family, as well as relations with compounds of other elements. It is suggested (p. 11) that, "Similarities in properties of certain groups of elements...are not fortuitous but are a result of a fundamental likeness in the structures of the atoms of these elements." This idea is not carried out to the extent of its possibilities in the discussion of the elements in their periodic groups. Without some such classification, a listing of the properties of elements and compounds seems to the student a hopeless collection of unrelated facts.

The discussions of industrial processes are excellent examples of concise treatment. More figures and illustrations would have added to the appearance of the book.

A. J. SCARLETT, JR.

Quantitative Analysis. By EDWARD G. MAHIN, Ph.D., Professor of Analytical Chemistry in Purdue University. International Chemical Series, H. P. Talbot, Ph.D., Sc.D., Consulting Editor. Third edition. McGraw-Hill Book Company, Inc., 370 Seventh Avenue, New York; 6 and 8 Bouverie Street, E. C. 4, London; 1924. xvii + 595 pp. 120 figs. 21 × 14 cm. Price $4.00.

It will always remain a matter of individual opinion how much should be included in a textbook of quantitative analysis. In this book the author has devoted half the space to the usual simple gravimetric, volumetric and electrolytic determinations, after which he has described in a few chapters methods involving the use of special apparatus, such as the polariscope, calorimeter and refractometer. The rest of the book is devoted to the analysis of industrial products and raw materials, with a chapter on assaying. This part is not complete enough to take the place of more comprehensive reference books. One wonders just what determined the choice of materials so that, for example, paints and varnishes are not mentioned, although oil, fats and waxes are discussed. The reviewer feels that it is a mistake to attempt to write a book on quantitative analysis which is both a textbook and a compendium of industrial methods.

No mention is made of electrometric methods of titration, although it would seem that this subject more properly belongs here than does a chapter on the heat treatment of steel.

The physico-chemical principles involved in analytical processes are not elucidated as fully as might be desired.

Certain errors occur which may be eliminated in a future edition. A few may be mentioned. On p. 78 it is erroneously stated that if aluminum hydroxide is ignited in the presence of ammonium chloride, volatilization of aluminum chloride occurs. On p. 84, from a comparison between the perchlorate and chloroplatinate method for potassium, one would suppose that the former was less accurate and convenient, whereas such is not the case. The statement here and on p. 91 that the preparation of aqueous perchloric acid is dangerous is absurd. It is, however, quite unnecessary to prepare it because C. P. 60% acid has been on the market for years and is no more dangerous than other common acids. The use of 20% acid is a disadvantage not an advantage. On p. 91 it is stated that no definite data on the solubility of sodium perchlorate in alcohol are available. The method suggested for removing ammonium salts by evaporation with sulfuric acid is very undesirable, because it is then necessary to reconvert to chlorides with consequent loss by occlusion. The familiar method of evaporating with nitric and hydrochloric acids is much easier and more accurate. On p. 125 the e. m. f. of the Edison cell is given as 1.6 volts instead of 1.2. On p. 182 the curve for phosphoric acid indicates that this acid cannot be accurately titrated, and this statement is made on the following page, whereas it is a matter of common knowledge that such a titration is possible. In steel analysis no method for V is given, although it is included in the table of contents.

In spite of these criticisms the book contains a wealth of valuable information. It is well written and gives frequent reference to original papers. It contains many well selected problems. It can be recommended as a textbook for elementary and advanced classes.

H. H. WILLARD

Anleitung für das Praktikum in der Gewichtsanalyse. (Laboratory Manual of Gravimetric Analysis.) By Dr. R. Weinland, o. Professor an der Universität Würzburg. Third enlarged and revised edition. Theodor Steinkopff, Dresden and Leipzig, 1925. viii + 132 pp. 3 figs. 23 × 15.5 cm. Price, unbound, M. 6.

This little book is rather unusual in that it contains nothing about the general operations of gravimetric analysis and only a few pages are devoted to a discussion of the ionization theory, the law of mass action and the method of calculating results. It consists of brief working directions for carrying out 20 simple determinations, 34 separation methods involving ores, alloys, etc., and 13 electrolytic methods. Questions are frequently introduced to call attention to important points and the reactions are well explained. There are abundant references to original papers. One noteworthy feature is the inclusion of many new methods not yet included in reference works on quantitative analysis, as well as some which have never been published elsewhere. Some excellent methods are not mentioned, for example, Starck's method for determining fluorine as $PbFCl$, and the phenylhydrazine method for aluminum which is widely used in this country. The pyrogallate method is given for bismuth but not for antimony.

Because of the large number of methods described, this book will be found very useful for reference, but as a laboratory text it would need to be supplemented by preliminary lectures or an elementary text.

H. H. Willard

Selenium. A List of References, 1817–1925. By Marion Foster Doty. New York Public Library, New York City, 1927. 114 pp. 17.5 × 25.5 cm. Price $0.65.

Although this book is only intended to contain the titles of works relating to selenium published between 1817 and 1925, and *owned* by the New York Public Library on June 1, 1926, it is apparently a complete index to selenium literature for the period mentioned.

The references in addition to being in chronological order are grouped under the following subjects:

- Bibliography
- General Works
- Mineralogy and Crystallography
- Physical and Chemical Constants
- Electrical and Optical Properties
- Cells and Their Uses
- Other Industrial Applications
- Chemistry
  - General and Inorganic
  - Organic
  - Analytical
  - Biochemistry
  - Colloidal Selenium
- Patents

This division of material has given the list of references additional value since with the subject index, the author index and the patent index, the location of an individual article is made particularly easy.

Those who find it convenient to use the facilities of the Reference

Department of the New York Public Library will find the Library Catalog Reference Letters given with each item listed.

There is little doubt that this publication will prove to be a great help to those who are interested in selenium research.

V. W. MELOCHE

Indicators: Their Use in Quantitative Analysis and in the Colorimetric Determination of Hydrogen-Ion Concentration. By DR. I. M. KOLTHOFF, Conservator of the Pharmaceutical Laboratory of the State University, Utrecht. Translated by N. Howell Furman, Ph.D., Assistant Professor of Analytical Chemistry, Princeton University, Princeton, New Jersey. John Wiley and Sons, Inc., 440 Fourth Avenue, New York; Chapman and Hall, Limited, London; 1926. xii + 269 pp. 23 figs. 23.5 × 15 cm. Price $3.50.

This book discusses fully the theory of neutralization, hydrolysis, buffer action, amphoteric compounds, determination of *P*H, titrations and related phenomena. The mathematical treatment is ample. The use of indicators in determining the *P*H of solutions and in titrations is described in detail both from a practical and theoretical standpoint; also the use of indicator papers. The theory of the color change of indicators and the effects of alcohol, neutral salts and proteins are fully discussed. There is an interesting chapter on the practical applications of indicator methods. Few errors appear. At the top of p. 142 the Sørensen buffer should be made up using 1/15 mole of Na_2HPO_4 instead of 1/10. On p. 130, line 19, "Exsiccator" should be replaced by "desiccator." The term "table salt" is used frequently instead of "sodium chloride."

This book is well written and should be available to all who have occasion to do any work in this field.

H. H. WILLARD

Abridged Scientific Publications from the Kodak Research Laboratories. Vol. X, 1926. The Eastman Kodak Company, Rochester, New York, 1926. 247 pp. Illustrated. 17 × 24 cm.

This valuable booklet contains the essential material of thirty-eight papers previously published in seventeen journals, scientific and industrial. It serves alike to propound major problems of present-day photography and to record the progress being made toward their solution. The critical discussion of reports from other laboratories contributes not a little to the picture.

While such titles as "Flocculation and Deflocculation of the Silver Halides" and "Simplified Deduction of the Doppler Effect for Elliptic Space" duly represent the theoretical aspects of the science, there is a preponderance of articles of lively interest and immediate value to practical photographers or even to unskilled amateurs. The problems of the motion picture industry, also, receive considerable attention. Especially suggestive to moderately advanced workers are "Characteristics and Anomalies of Emulsions on Development," "Contrast of Photographic Printing Paper" and "On the Relation between Time and Intensity in Photographic Exposure, IV."

The Abridged Scientific Publications are worthy of wide distribution and careful study.

G. S. FORBES

Principles of Organic Chemistry. By DAVID E. WORRALL, Ph.D., Professor of Organic Chemistry in Tufts College. Longmans, Green and Company, 55 Fifth Avenue, New York City, 1927. xii + 312 pp. 20.5 × 14 cm. Price $2.50.

We already have a number of excellent and highly satisfactory textbooks of organic chemistry, and they are being kept up to date. This good book is a further addition to the list.

It begins, we believe unfortunately, with a study of alcohols. On page one are given the two possible structural formulas of ethyl alcohol, followed immediately by the structures of higher alcohols. It seems to me that this is a very heavy dose for the beginner. Organic Chemistry is quite difficult for beginners during the early stages of its study and hard enough even when we begin with the simplest of hydrocarbons, methane. The statement is made that alcohols are the subject of the first chapter because "in actual (laboratory) practice one starts with an oxygen-containing compound." However, some of the best laboratory manuals begin with the preparation of methane. Theoretically and practically this leads on easily and logically to the halides and then to the alcohols; and I think we can also say that students are more familiar nowadays with "gas" than with alcohol. Neither do I like the order of the other subjects in the aliphatic series. Of the several arrangements used by writers, however, no one can be dogmatically called the best.

The statements throughout the book are very carefully made and the book is very readable.

ALVIN S. WHEELER

Neue Methoden der Organisch-Chemischen Analyse. (New Methods of Organic Analysis.) By H. TER MEULEN, Professor at the Technical High School of Delft, and Dr. J. HESLINGA. Akademische Verlagsgesellschaft m. b. H., Leipzig, Germany, 1927. v + 49 pp. 22 figs. 15 × 21 cm.

This interesting booklet presents detailed directions for the quantitative estimation of carbon, hydrogen, oxygen, nitrogen, sulfur, the halogens, arsenic and mercury in organic compounds. Special attention has been given to the determination of nitrogen in coal and in coke, and to methods for estimating the sulfur content of petroleum and petroleum products. While some modifications of the standard oxidation combustion methods are given, the novelty in most of the methods presented lies in the extensive use of catalytic hydrogenations. Approximately one-third of the pages are devoted to a direct method for the determination of oxygen, together with modifications of the procedure needed when nitrogen, sulfur, the halogens and other elements, interfering with the smooth running of the process, are present. By hydrogenation in the presence of nickel, the carbon is converted to methane, and the oxygen to water which is collected and weighed.

While, in all probability, few of these methods will supplant those now in general use, it is refreshing to find investigators attempting reasonable, if radical, advances in the field where the classic work of Liebig and Dumas was accomplished.

G. ALBERT HILL