

Synthesis of *Iso*-amylcyclopentane.—*Iso*-amylcyclopentane was prepared by methods similar to those used by Chavanne and Becker in the synthesis of ethylcyclopentane.¹ *Iso*-amylcyclopentanol was prepared from cyclopentanone and *iso*-amyl bromide by a Grignard reaction; this alcohol was dehydrated with *p*-toluenesulfonic acid and the resulting cyclopentene was hydrogenated with platinum black as a catalyst.

The following physical constants were determined: *iso*-amylcyclopentanol—colorless, oily liquid, pleasant odor, b. p. 101° at 17 mm., $d_4^{26} = 0.8848$, $n_D^{26} = 1.4549$; *iso*-amylcyclopentene—colorless, mobile liquid, petroleum-like odor, b. p. 168–170° at 760 mm., $d_4^{25} = 0.8010$, $n_D^{25} = 1.4467$; *iso*-amylcyclopentane—colorless, mobile liquid, petroleum-like odor, b. p. 168–170° at 760 mm., $d_4^{25} = 0.7837$, $n_D^{25} = 1.4321$.

CONTRIBUTION FROM THE
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UNIVERSITY OF LYONS

LYONS, FRANCE

RECEIVED MAY 27, 1929
PUBLISHED AUGUST 7, 1929

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NEW BOOKS

Volumetric Analysis. By I. M. KOLTHOFF, Professor of Analytical Chemistry at the University of Minnesota, with the collaboration of Dr. Ing. H. MENZEL, Dresden. Translated by N. HOWELL FURMAN, Ph.D., Associate Professor of Analytical Chemistry, Princeton University. Vol. II. **Practical Volumetric Analysis.** John Wiley and Sons, Inc., 440 Fourth Avenue, New York, 1929. xiv + 552 pp. 18 figs. 15 × 23.5 cm. Price \$5.00.

This book represents, beyond all question, a scholarly, interesting and valuable contribution to the literature of analytical chemistry and one which deserved translation. The original intention had been to write merely a treatise on the underlying theories of titration methods with the idea that H. Beckurt's revision of F. Mohr's well-known book would still serve as a text-book of practical methods, but since the publication of the Beckurt book there has been such a marked development in this branch of analytical chemistry that it seemed wise to write a new, critical and comprehensive work. The text of Beckurt, however, has been used freely in the preparation of this new book. To give some idea of the thoroughness with which Dr. Kolthoff has combed the journal literature, it may be mentioned that there are about one thousand footnotes and in one case more than fifty references are given in a single footnote. There is hardly a paper written during the last fifteen years on volumetric procedure that does not receive consideration or mention.

The book is not intended as a text for beginners. The discussion presupposes a considerable knowledge of chemical principles and only rarely are the directions given in sufficient detail for the beginner to follow.

¹ Chavanne and Becker, *Bull. soc. chim. Belg.*, 36, 591 (1927).

Moreover, for the sake of completeness many methods are mentioned which have not been found useful and the beginner could not fail to become bewildered by the mass of material contained in such a small space.

The book, despite its title, is not written for the practical man who merely wants to know how to make analyses and get results. Such a person cares little for the scientific explanation of the chemical principles involved and is more interested in the analysis of ores than of solutions of fairly pure substances. He wants to know the best method, if such there be, rather than all possible methods that are good. In this book, for example, the ferrocyanide method of titrating zinc solutions is considered in considerable detail, and the results of some careful experimentation by the author are given (although he overlooked the excellent monograph by Nissenson and credited to W. W. Scott a method recommended by F. G. Breyer of the New Jersey Zinc Co. in Scott's book). For the analysis of zinc ores, on the other hand, the reader is referred to the voluminous work of Lunge-Berl and this is the very thing that will interest the practical man.

The comments which Dr. Kolthoff makes upon the various methods are interesting and good. For the most part, chemists will agree with his conclusions. Outside of the book by Clark and Lubs, there is probably no English text that compares with this in the discussion of suitable indicators for neutralization titrations. Again, with respect to the selection of proper standards, the discussion is most painstaking and methods of testing and preparing many suitable standards are given.

Besides the usual methods of acidimetry and alkalimetry, oxidation-reduction and precipitation, methods are given involving the use of potassium bromate, potassium iodate, ceric sulfate and titanous chloride as titrating agents. The methods include the examination of organic substances and all sorts of nitrogen compounds, as well as inorganic substances.

The work of the translator has been faithfully done and he has included, with the cooperation of Dr. Kolthoff, about fifty pages of material not found in the original text. The book is practically free from misprints. At times the translation is too literal and the English rather awkward. Thus the use of the word *performance* on page 205 instead of *procedure* is a little unusual and the sentence on page 46, "*The test of utility by means of very exactly performed titrations, on the other hand, remains after it has been once performed,*" is just a bit difficult to understand and arises from the attempt to translate literally. So faithful to the original text has Dr. Furman been, that he gives an atomic weight table as published in 1925 rather than change a figure in the original text.

Acting upon the suggestion of Schoorl, Kolthoff enthusiastically advocates the use of "rational" rather than "international" atomic weights because the more accurate values are based upon weighings corrected

for air displacement. Thus he gives three atomic weight tables in the book, one of international atomic weights for 1925, Schoorl's *rational* table and one of atomic weights rounded to 0.1 per cent. In the opinion of the reviewer this practice is more likely to lead to confusion than if the latest table of international atomic weights is used alone. Schoorl's point may be a good one but there is little chance of the *rational* table being adopted. It is most important that chemists should all use the same atomic weights to avoid confusion.

W. T. HALL

Analytical Chemistry. Volume II. Quantitative Analysis. Based on the text of F. P. TREADWELL, Late Professor of Analytical Chemistry at the Polytechnic Institute of Zurich. Translated, enlarged and revised by WILLIAM T. HALL, Associate Professor of Analytical Chemistry, Massachusetts Institute of Technology. Seventh edition. John Wiley and Sons, Inc., New York, 1928. xiii + 848 pp. 152 figs. 15 × 23.5 cm. Price, \$6.00.

The seventh edition contains numerous minor changes and a syllabus of the two semester course in analytical chemistry as given to students of chemical engineering at the Massachusetts Institute of Technology.

Considering the size and contents of the book, the material has been brought up to date in the case of magnesium and others but in the case of potassium the improvements of Smith and others have been omitted. It may be necessary in another edition to omit the details of methods which are obsolete and unreliable since they are only of historical importance. It is highly desirable that the relative precision and accuracy of the various methods of analysis of the same constituent be given.

A considerable amount of the theory is taken up in the class room, according to the syllabus. This feature necessitates references to other textbooks and articles in the journals. In this connection some space should be devoted to constant-boiling hydrochloric acid.

The milliequivalent of iodine is given as 0.12685 (p. 553) instead of 0.12693. The word "currents" (p. 464) was erroneously used in the electro-metric titration discussion.

The book is surprisingly free from typographical errors.

The foregoing statements are suggestions from the ideal standpoint. Treadwell and Hall's book is and should be in the library of every chemist who aims to do precise and accurate analysis.

STEPHEN POPOFF

Photometric Chemical Analysis (Colorimetry and Nephelometry). Vol. II. **Nephelometry.** BY JOHN H. YOE, Ph.D., Professor of Chemistry, University of Virginia. With contributions by HANS KLEINMANN, M.D., Ph.D., University of Berlin. John Wiley and Sons, Inc., New York, 1929. xvi + 337 pp. 44 figs. 15 × 23.5 cm. Price, \$4.50.

Nephelometry and the rapid development that this branch of chemical analysis has undergone within the past decade are well epitomized in

Volume II of "Photometric Chemical Analysis." The latter initiates a systematic discussion of a subject which has heretofore been accessible only in scattered publications. Part I of "Nephelometry" is devoted to the history and description of various types of nephelometers, directions for use, nephelometric research and the theory of nephelometry. The remaining two parts discuss various inorganic and organic determinations, respectively. In the inorganic section comprising Part II the determinations of ammonia, arsenic, calcium, chlorine, phosphorus and sulfur are described in detail, while nephelometric procedures for acetone, amylase, dichloro-ethyl sulfide, fats, lipase, nucleic acids, pepsin, proteins, purine bases and trypsin constitute Part III. From a critical point of view it would appear that the chapter on the theory of nephelometry could be amplified to the distinct advantage of the book and might well include a discussion of coalescence and the factors influencing particle size. On the other hand, the discussion of the nephelometric constant appears to be somewhat labored. Furthermore, it will probably prove advantageous in future editions to transfer some of the material, such as the bisulfite method for lead and the ferrocyanide method for zinc, of Volume I to Volume II. These are nephelometric rather than colorimetric methods.

The thanks of all who are interested in this type of analytical procedure are due the author for so adequately crystallizing the literature of nephelometry and presenting it within such convenient compass.

LAWRENCE T. FAIRHALL

The Industrial Development of Searles Lake Brines. By JOHN E. TEEPLE, Ph.D., Consulting Chemist and Chemical Engineer. American Chemical Society Monograph Series. The Chemical Catalog Company, Inc., 419 Fourth Avenue, New York City, 1929. 182 pp. 60 figs. 15.5 × 23.5 cm. Price, \$3.00.

It is a great pleasure to American chemists, whether in the industrial or the theoretical field, to have at last this story of the Searles Lake development, which all have heard about and but few have known about. Now at last we can know something about it—not all, by a large margin, but still a great deal; and all American chemists can now have a substantial pride both in the success of an immensely important enterprise, and in the courage which Dr. Teeple has shown in publishing some of the real facts about the work. Perhaps Dr. Teeple doesn't think that it has required courage to give the world the data on this magnificent piece of phase-rule work; but whatever it is that has given us the result, Dr. Teeple has it to an extent that is commendable, and it is to be hoped that his example may be copied.

Part I of the book gives a running tale of the history and development of the plant. The Searles Lake brine is essentially a seven-component system. The commercial output consists of pure potassium chloride and

borax. The separation has required a carefully designed and well operated plant—which means good chemical engineering; and it has required an exact knowledge of the various equilibria possible in this system at a variety of temperatures—which means good physical chemistry. The combination is not new, but it has not been overworked in this country. May this book convince many that it is a profitable combination!

Part II contains the equilibrium data and diagrams. Under the 32 headings there are given data for sixteen systems of two components, thirty-eight of three components, and one of six components; some are reported on at one temperature only, many of them at several temperatures. The sulfates, carbonates, borates and chlorides of sodium and potassium form the majority of the systems. For each isotherm, the composition of the isothermally invariant solutions is given in units of weight and in molar units; the univariant systems are usually represented by straight lines. The sum total of this huge mass of data can be appreciated only after careful study. It is a compilation of phase-rule work which has no equal in American chemistry, and ranks with the classic investigations of van't Hoff and his colleagues on the Stassfurt salt deposits. There is very clearly still more to be printed about these systems, and it is to be hoped that in time each of them will be given to us in the detail necessary for complete usefulness. May Dr. Teeple and his co-workers thus increase still further our debt to them for this admirable investigation.

ARTHUR E. HILL

Anorganische und Organische Entfärbungsmittel. (Inorganic and Organic Decolorizing Agents.) By Dr. LEOPOLD SINGER, Vienna. Theodor Steinkopff, Residenzstrasse 32, Dresden-Blasewitz, Germany, 1929. xi + 251 pp. 15.5 × 22.5 cm. Price, unbound, R. M. 20; bound, R. M. 21.50.

The author points out that in spite of the increasing importance of decolorizing agents no comprehensive summary of the work that has been done upon them exists. The present volume is designed to fill this gap. The field is, however, so large that the author has restricted himself to a consideration of the articles and patents that have appeared since the war.

Both inorganic and organic decolorizing agents, that is, both decolorizing earths and decolorizing charcoals are covered. The headings of the chief chapters are as follows: Occurrence, Properties, Theories of Decolorization, Manufacture, Use, Regeneration. At the end of the book, there is an excellent list of the patents dealing with decolorizing agents.

The treatment is intentionally non-critical; it is also brief in its discussion of the separate articles and there is no claim for completeness. The book is valuable in that it furnishes a convenient and reasonably

complete compendium of the recent work on decolorizing agents. It will surely be of great use to investigators in this field.

ARTHUR B. LAMB

The Pyrolysis of Carbon Compounds. BY CHARLES DEWITT HURD, Associate Professor of Chemistry, Northwestern University. American Chemical Society Monograph Series. The Chemical Catalog Company, Inc., 419 Fourth Ave., New York, 1929. 807 pp. 15.5 × 23.5 cm. Price, \$12.50.

The pyrolysis of carbon compounds is a branch of organic chemistry that is rapidly growing in importance from both the practical and theoretical point of view. Processes involving pyrolysis are being used in industry extensively and, to a limited degree, in the interpretation of the mechanism of the severing of molecules by heat. Much of the work in this field of organic chemistry has been largely empirical. There is a great opportunity at present to extend the work through experimentation planned to gain clearer concepts in regard to the strength of the forces of attraction between atoms and to the variations in electron affinities associated with changes in structure. The appearance of this monograph is, accordingly, especially timely.

The author has been particularly successful in gathering the large amount of material scattered throughout the literature. Much of it, no doubt, could not be found by consulting indexes only. The extensive array of facts has been well systematized and is presented in an interesting way. Wherever the facts warranted generalizations, they have been made. The several chapters deal with the various types of compounds, such as hydrocarbons, halogen compounds, acids, esters, etc. Molecular rearrangements produced by heat are considered in addition to reactions of decomposition.

On account of the large number of facts assembled, the author felt it inadvisable to include any consideration of the effects of catalyzers in reactions of pyrolysis. One naturally is averse to prolonging a book beyond 800 pages. It is the opinion of the reviewer, however, that even a brief treatment of the effect of catalyzers on the pyrolysis of the several classes of compounds would have added to the excellence of the book.

This monograph should be available to all students specializing in the study of organic chemistry, and to research workers in industrial laboratories. The author has accomplished a real service, which will lead to increased activity in the study of an important division of the science.

JAMES F. NORRIS