

Reviews.

ANALYTICAL CHEMISTRY. Vol. I.: Qualitative. By F. P. TREADWELL, Ph.D. Translated and Revised by W. T. HALL. Fifth English Edition. Pp. 573. New York: John Wiley & Sons; London: Chapman & Hall. 1921. Price 23s. net.

Unless a student of chemistry has a good working knowledge of the physico-chemical principles underlying reactions, there is every likelihood that to him qualitative analysis will be more or less an unintelligent application of the analytical processes given in text-books. Such a training, besides being of doubtful value from an educational point of view, is scarcely conducive to the making of a good analyst; it being vital that he should understand as much as possible each process he employs to enable him to carry it out most efficiently. Attaching due importance to the value in qualitative analysis of these physico-chemical conceptions, Professor Hall departed somewhat from the text of Treadwell in preparing the previous edition, and, in addition to incorporating an account of these theories, rendered the work more comprehensive by revising the whole text in accordance with them. In the preface of the present edition he states that the annual sales of the book in its revised form have been more than doubled—a point which speaks for itself.

The scope of the volume is essentially the same as that of the former edition. The work has, however, been brought up-to-date, apparently by comparison with the latest edition of Fresenius' *Qualitative Analysis*, and, moreover, several useful alternative separation tables have been added. These tables have been taken from the 1919 edition of Noyes' *Qualitative Chemical Analysis*, and have been carefully investigated by A. A. Noyes and his collaborators. The student thus finds himself confronted with the choice of several methods, but with very little information relating to their peculiar merits. It is stated, on page 199, that "one scheme is best under certain conditions, and another scheme under different conditions." This statement is substantiated by reference to such phenomena as the carrying down of zinc and magnesium by chromium when precipitated as hydroxide by the addition of excess of ammonium hydroxide in presence of ammonium chloride. To a large extent, the success of an analyst depends upon how far he overcomes difficulties of this nature, yet the instance quoted is the only attention paid to this important problem of occlusion by gelatinous precipitates; no reference having been made to it in Part I. on "General Principles." Reference could well have been made to the recent investigation by Yasui (*Mem. Coll. Sci.*, Kyoto, 1919, 4 (2), 65-67) on the attempted separation of the hydroxide of zinc from that of chromium, in which he found that very considerable amounts of zinc were retained, even after three treatments of the precipitate of chromium hydroxide.

It seems more desirable that one scheme of analysis, with full details of its defects, should be given, and this the student should be advised thoroughly to comprehend and to adopt, after having made himself conversant with the tests

for the ions. Then he will be in a position to appreciate other schemes, or even to devise suitable methods to eliminate difficulties, which may arise. Subsidiary schemes, therefore, should be accompanied with notes on their particular uses. Apart from these remarks, the various procedures given are exceptionally well described.

A few minor faults appear in the arrangement of the work. Surely the place for the very fine description of Spectroscopic Analysis, which is given under the reactions for barium, is in the section on "General Principles." Again, the reactions of hydrogen peroxide are given under "Sodium." Should they not be inserted in the part on "Anions," viz. Part III.?

Although the work has been largely modernised, a few instances appear in which the translator, or rather the reviser, has too rigidly adhered to the original text, and has consequently described processes which now seem quaint. In Part I., on "General Principles," we are told at great length how to carry out reductions on charcoal sticks obtained from splinters having good, straight fibres such as old-fashioned brimstone matches. Incidentally, these reactions are described as "exceedingly beautiful reactions and are among the most sensitive . . . and should be faithfully practised by every beginner." Borax beads are rendered sticky "by moistening with the tongue," in order that the substance to be tested may adhere.

The work is remarkably free from errors. The following point, however, should be mentioned. Equations illustrating reactions in which basic salts are precipitated give definite formulae for the basic salts as if they were well-defined compounds. As examples, the following may be quoted:— $\text{Co}(\text{OH})\text{Cl}$, $\text{Zn}_2(\text{OH})_2\text{CO}_3$, $\text{Ni}_2\text{SO}_4(\text{OH})_2$, $\text{Cu}_2(\text{OH})_2\text{SO}_4$, $\text{Al}(\text{OH})_2\text{C}_2\text{H}_2\text{O}_2$, $\text{Fe}(\text{OH})_2\text{C}_2\text{H}_3\text{O}_2$, and $\text{Mg}_4(\text{CO}_3)_3(\text{OH})_2$. In one case only, viz. the last, is it pointed out that the "composition of the precipitated salt varies with temperature and concentration," but, in spite of all this, the "salt" represented is "often obtained." Judging from the number of times the word "molal" is found, it appears to have taken the place of the generally accepted term "molar," although the latter word is sometimes found in the text. The unnecessary adoption of such new terms is not desirable.

On the whole, the work has been compiled on modern lines, and will continue to rank as a standard work on the subject of Qualitative Analysis.

HUBERT T. S. BRITTON.

ORGANIC SYNTHESSES. Vol. I. ROGER ADAMS, Editor in Chief. New York: John Wiley & Sons; London: Chapman & Hall. 1921. Price 8s. 6d. net.

Ever since 1914 the supply of organic chemicals for research and other purposes has been a matter of great difficulty. Even when supplies were available the cost was in many cases prohibitive, so that the chemist was compelled to prepare his own reagents: his troubles did not end even here, for he was faced with the further difficulty of the incompleteness or even total absence of instructions for their preparation. It is to overcome these difficulties that this book is written. The intention of the authors, or rather editors, is, that it should be the first of a

series of volumes appearing annually, and each containing instructions for the preparation of about twenty compounds in quantities up to about five pounds. A number of chemists have taken part in the work: each preparation has been thoroughly worked out by two of them and their results checked by two others.

All concerned in the compilation of this volume may be congratulated. The instructions are clearly given, and useful notes are added on points of importance; there are abundant references to original papers; where necessary, simple diagrams are given of a suitable form of apparatus; the printing and general style leave nothing to be desired. One of the most noticeable features is the very satisfactory yields stated to be obtained—in nearly every case over 90 per cent. of theory. This suggests that it is only the absence of exact knowledge on points of detail that causes the poor yields in such a large number of organic preparations, and raises the hope that a time will come when a yield of less than 90 per cent. will be the exception rather than the rule.

As a book of instruction for students, this volume is not likely to be of much value, as it deals mainly with compounds not usually prepared by students. The small amount of ground covered naturally limits its usefulness also to the manufacturer and research chemist; but, as years pass and succeeding volumes are added to the first, the series will be of the very greatest utility, and should find a place in every organic laboratory.

The editors welcome the assistance of any chemist who can contribute details of improved methods or make any suggestions that will add to the value of the series.

A. F. KITCHING.

AN INTRODUCTION TO THE PHYSICS AND CHEMISTRY OF COLLOIDS. By EMIL HATSCHEK. Fourth Edition (entirely re-written and enlarged). Pp. xiii +172. London: J. & A. Churchill. 1922. Price 7s. 6d. net.

The first edition of this book appeared in 1913, and at once gained approval and popularity, which has increased with each succeeding edition. The present volume has been entirely re-written and enlarged, and is the best introduction the student could have to the fascinating field of colloids. The book is very readable, accurate and up to date, and surveys in excellent fashion the present position of the more salient points in colloid physics and chemistry. Especially good are the sections dealing with viscosity, gels, adsorption and emulsions. The latter subject is only now finding its way even into the larger text-books, and Mr. Hatschek's summary is thus all the more valuable to the beginner.

The text discusses many standing difficulties in colloid theory, and points out several interesting lines for further research. The reviewer, however, was surprised to find no mention at all of Loeb's work on the influence of hydrogen-ion concentration in protein studies (especially with gelatin), although the so-called Hofmeister and Pauli series receive due attention, and the obvious difficulties involved are evidenced.

The binding, printing and illustrations are very good indeed, and it has been a distinct pleasure to read the book.

WILLIAM CLAYTON.

POISONS: THEIR EFFECTS AND DETECTION. By ALEXANDER WYNTER BLYTH, M.R.C.S., F.I.C., and MEREDITH WYNTER BLYTH, B.A., B.Sc., F.I.C. Fifth Edition. London: Charles Griffin & Co. 1920. Price 36s.

This edition of "Poisons" retains the general design of previous editions, but, as stated by the authors in their preface, some work has been omitted and replaced by more modern methods.

The short, but interesting Part I., deals with the old poison lore, and gives a brief account of the growth of modern methods of toxicological analysis. The appendix of the earlier editions (dealing with antidotes) has been omitted in the present volume.

The present edition of this book contains a large number of references, as in the case of the previous edition, but, although certain modern references are given, very many are far from recent; it is somewhat mis-leading to refer to a method of 1893 as a new method (as is done on page 551, dealing with oxalic acid). Several instances of this character detract, to some extent, from the value of the work.

Considerable stress is laid by the authors on micro-chemical methods for the detection of poisons; this addition to the present work, and will be very welcome to many who may be confronted with the detection of minute quantities of poisons (especially organic) in viscera.

The various poisons are dealt with at fair length in most cases, and some very fully. The reader, however, misses with regret one or two, the inclusion of which would have enhanced the value of the book. Some reference to hydroquinone and the other di-phenols would have been welcome; but no mention, apparently (excepting very indirectly) of these three di-phenols is made, notwithstanding their toxic properties, and the frequent use of at least one of them (hydroquinone).

It is to be regretted that some errors present in previous editions still remain in the revised volume. For instance, in the description of the iodic acid test for morphine, it is stated that "if morphine be present, the carbon disulphide *floats to the top* distinctly coloured pink." It is rightly pointed out in the present edition that "other substances, however, also set free iodine from iodic acid"; but in mentioning the further test, namely, the after-addition of ammonia, it would have been of interest if the reference had been given respecting the authority for the somewhat curious statement that "*the pink colour of the carbon disulphide is deepened* if morphine was present; on the contrary, if morphine was not present, it is either discharged or lessened."

The authors in the present edition again refer in several cases to another of their publications ("Foods") for a description of the method of analysis to be employed. It is perhaps unfortunate that they could not see their way to describe the methods in the present volume of *Poisons*.

The book will be found a valuable one for reference, notwithstanding the

above blemishes; many methods of analysis are described, and, although frequently no guide is given as to the most reliable, this may not be disadvantageous, since it tends to cause the reader to carry out the various methods, and thus find the method which gives the most reliable results.

JOHN WEBSTER.

PETROLEUM. By SIR BOVERTON REDWOOD, Bart., D.Sc., F.R.S.E., F.I.C., &c. Fourth Edition. Three volumes. Pp. 1353 (with plates and maps). London: Chas. Griffin & Co. 1921. Price £5 5s. net.

So far as it is possible to embody in a single treatise existing knowledge in a technical subject, Sir Boverton Redwood's treatise on "Petroleum" is one of the most complete. In the mass of detailed information which it contains on all branches of the subject, it reminds one of the classical volumes on metallurgy written by the late Dr. Percy, and is itself a classic on the subject of which it treats.

The present edition is noteworthy in many ways. Not only has it been very thoroughly revised and largely re-written, with the help of a number of friends and colleagues of the author, whose names are a sufficient guarantee of their competence, but this laborious work was carried nearly to completion during the war, and the author was engaged in finishing it up to within a few days of his death, which occurred quite suddenly in June, 1919.

The general plan of the book remains the same as in former editions. The first two sections deal with the History and Distribution of Petroleum, and, in view of the rapid development of this industry in recent years, it is not surprising that these chapters have more than doubled in size since the first edition was published in 1896. The first petroleum well was drilled in 1859, and the entire modern petroleum industry has arisen during the lifetime of the older members of the present generation.

Sections 3 and 4, on the Physical and Chemical Properties and Origin of Petroleum, have been largely re-written by Prof. Brame and Dr. Dunstan, and their work has been as thoroughly done as one would expect. All the most important work, up to the date of the revision, will be found, either in the text or in the numerous references to original papers.

Sections 5 and 6, describing the methods adopted in different countries in the production and refining of the crude oil, have also undergone considerable expansion. There is a little overlapping on pages 517-18 and 525-6, the refining processes of Edeleau, Macalpine and Adiyasievitch being described twice over.

Section 7, on the Shale Oil and Allied Industries, has been completely revised and largely re-written.

Section 8 is devoted to the Transport, Storage and Distribution of Petroleum. In the United States, nearly 45,000 miles of pipe line are now in use, the total daily capacity of which is two million barrels. Some of the pages of this section

most useful to the analyst are pp. 696–713 on fire and explosion risks connected with petroleum vapour and mixtures of the vapour with air.

Section 9, on Testing Methods, to which the analyst will most frequently refer, contains a description of the principal tests applied in the examination of crude oils, fuel oils, lubricating and illuminating oils, residuum, paraffin and asphalt. Reference is made on page 831 to the advantage which attaches to the expression of viscosity values in absolute measure. A panel appointed by the British Engineering Standards Association is now engaged in the consideration of this subject, and it is to be hoped that the work of this panel may lead to the employment of more uniform methods of measuring viscosity, with easily manipulated apparatus based upon correct scientific principles, and to the expression of results in terms which will be as readily intelligible as those in which other physical properties such as density are expressed. The author's remarks (pp. 842–847) on the viscosity test in relation to friction-testing machines, though written many years ago, are still of interest and importance. In nearly all the machines which he describes, the oil is tested under conditions which measure only the friction due to its viscosity, hence the apparent close relationship between the viscosity and lubricating power to which he refers on page 846. The property of "oiliness," which is now recognised as of very great importance, has no connection with viscosity, and is not measured by these machines as they are generally used.

Section 10, on the Uses of Petroleum and its Products, revised by Prof. Brame, is one of the most interesting and valuable sections of the book. Some useful though brief remarks on Switch and Transformer oils, by Mr. Pollard Digby, will be found on pp. 887–889, and a sub-section on Casing-head Gasoline on pp. 934–939. The manufacture of "lampblack" from natural gas, usually known as "carbon black," is briefly described on pp. 939 and 940. There is a good sub-section on Petroleum as Fuel on pp. 940–965; and one on Petroleum Engines, by Mr. Worby-Beaumont, on pp. 965–978.

In the last section and appendices will be found the various regulations, British and foreign, relating to the testing, storage, &c., of petroleum and its products, Thames Conservancy Bye-Laws, Statistics of Production, and the Import Duties levied in different countries. A valuable Bibliography by Mr. W. H. Dalton, which occupies 163 pages, and includes 8804 references, and a good index, complete the work. In a Foreword to the first volume, Sir Fredk. Black has contributed a brief biographical notice of the author, which will be read with interest and appreciation by all who knew him. Much credit is due to the publishers for their enterprise in publishing this costly work, providing new maps, &c., and to all those who have been responsible for the correction of proofs, which appears to have been exceedingly well done. L. ARCHBUTT.
