

Reviews

WILEY'S "PRINCIPLES AND PRACTICE OF AGRICULTURAL ANALYSIS." Volume II. FERTILISERS AND INSECTICIDES. Third Edition. Edited by C. A. BROWNE and W. W. SKINNER. Pp. xvi+646, with 65 illustrations. Chemical Publishing Co., Inc., Easton, Pa., U.S.A.

The edition under review is the third, and it has been prepared and issued under the direction of the American Association of Official Agricultural Chemists. The original volume was written by the late Dr. H. W. Wiley with a view to enabling teachers, students and analysts to appreciate the principles underlying the science and art of analysis. As age and failing sight rendered intimate contact with the progress of agricultural chemistry difficult, Wiley presented the copyright of his works to the Association of Official Agricultural Chemists; the new volume is the outcome of the joint labours of several contributors. The work is intended to supplement the well-known *Official and Tentative Methods of Analysis of the Association of Official Agricultural Chemists*.

The first pleasing feature to be well noted in the new edition is that it contains fewer pages than its predecessor; yet the authors have been able to embody all the information considered of value in the second edition, and to add much new matter. Would that all authors of new editions might treat their readers with such consideration.

The book is very properly divided into two parts: the first, consisting of 474 pages, deals with fertilisers, and the second part (140 pages) with insecticides and fungicides.

In America the term "manure" is applied only to animal excrements with or without litter, and the term "fertiliser" is reserved for any other materials which may furnish plants with one or more of the elements necessary for normal growth, but apparently some potash salts have been named "Potash Manures." The title of the book, then, indicates that information is restricted to fertilising materials other than those typified by farmyard manure.

An early chapter deals with the varying methods of expressing the results obtained on analysis and reminds all concerned that reports are frequently required by people who are not chemists; though a new system of reporting may contain terms implicating greater scientific accuracy, it should be capable of being easily understood by those requiring a report. In this country we are aware that the farming community still thinks of nitrogen in terms of ammonia and of phosphorus in terms of calcium phosphate, and these instances emphasise the importance of making gradual any change in a system of reporting.

A short chapter on sampling provides much information and contains many illustrations of grinding apparatus. But perhaps the chapter does not stress sufficiently the importance of giving that attention to sampling which would invariably result in the small sample submitted to the laboratory being representative of the bulk. How many analytical differences obtained in laboratories have been due to careless sampling! This chapter also suggests that a sample which is reasonably dry and not caustic or acid may be placed in paraffined paper bags to facilitate transport to the laboratory. This procedure might well be adopted when loss of moisture is not to be feared, enabling samplers to have recourse to receptacles other than glass jars, which so frequently arrive at their destination in a broken condition. The 24 pages devoted to the occurrence and determination of moisture in fertilisers are of importance, for they contain the official methods used in many countries.

Information concerning the determination of phosphoric acid and the sources of phosphates very rightly occupies a considerable portion of the book. It is somewhat strange that under the description of bone products no mention is made of the nitrogen they contain, and, further, that the table showing the composition of typical samples does not state that any nitrogen is contained in raw bone or bone-meal, etc. In fact, the compositions of raw bone and bone-meal would appear to be identical, and this applies also to bone-charcoal and bone-ash.

Special consideration is given to nitrogen, its occurrence, its sources, and its agricultural uses. The chapter on the utilisation of the nitrogen of the air by the manufacture of salts containing nitrogen is interesting, and probably few realise that in 1929 the world's nitrogen-fixation capacity amounted to over 1,800,000 tons. Many chemical methods are quoted for the determination of nitrogen in its several forms as used by agriculturists. The Street permanganate method for testing the quality of insoluble organic nitrogen is reviewed, and the further work carried out on this important subject is more or less briefly described. The Street process, however, has not been very favourably received in this country, but for some purposes this process, or a carefully standardised modification, might be extremely useful.

Valuable information with regard to the occurrence, and the methods in use for the determination, of potassium is placed at the disposal of the reader.

The last portion of the work deals with insecticides and fungicides. In America the Federal Insecticide Act has a very wide application, and entails the examination of insecticides and fungicides. Therefore, the Act has directed attention to the sampling and analysis of insecticides. The subject may assume greater importance in this country, for a Bill to control the purity, etc., of

insecticides may at any time be promoted. For the sake of convenience the authors have grouped insecticides into chemical classes and have dealt with these under headings such as Arsenicals, Copper Compounds, Sulphur Compounds, Coal Tar Products, etc. Methods are described for the determination of arsenic, lead, copper, etc., and the process applicable in particular circumstances is given. The methods of analysis for lime sulphur are inadequate, but this may be due to legal requirements rendering the examination of lime sulphur unnecessary. English chemists should, at all events, bear in mind the excellent work carried out in this country by Goodwin.

The work is an excellent survey of knowledge covering the occurrence and sources of fertilisers and of the methods for determining various constituents of value to plants. With the continued growth of the commercial use of insecticides and fungicides, the information afforded will become of increasing importance to chemists, teachers and others.

F. W. F. ARNAUD

BIBBY'S BOOK ON MILK. Section I, Supplement No. 2, etc. Pp. 46+18. Liverpool: J. Bibby & Sons, Ltd. 1932. Price 4s. net.

The writer of this collection of pamphlets (obviously written or inspired by Mr. John Hanley) pays a subtle but possibly unconscious compliment to Public Analysts when he naively says (page 7): "The suspicion has recently dawned upon the writer that possibly his mental attitude is essentially different from that of many of his professional brethren on the probabilities of the position." That this has only happened recently is certainly no fault of Public Analysts, who for years have been trying to impress Mr. Hanley with the fact that his is a voice crying—not in the wilderness—but in the crowded township of unanimous disagreement. We are getting on; perhaps, in years to come, Mr. Hanley may at last realise that a man with opinions diametrically opposed to those of the whole of his co-workers is not necessarily right.

The matter submitted for review consists of one longer pamphlet and three small leaflets. The leaflets are reprints from various local newspapers, and give accounts of three recent cases in which Mr. Hanley claims to have been successful in getting the defendant discharged from the prosecution. There is no mention, however, of the two recent appeal cases in the North-West—in each of which the defendant, supported by Mr. Hanley, had his appeal dismissed with costs—nor of the case in South Staffordshire in which the Stipendiary Magistrate remarked that the defendant's heavy costs were largely due to the enthusiasm of Mr. Hanley. Other cases of a similar nature appear to have been overlooked, but not so a few lines reprinted from the *Bootle Times* of September 16th, 1932. As these occur in two separate places they seem to be of sufficient importance to quote: "Mr. John Hanley, of Bootle, who was successful in refuting the freezing-point test in a milk prosecution at Bootle, has been able to do likewise in a number of similar cases in various parts of the country. One of the most recent was at Taunton, where, he said, he did not agree that the freezing test could be relied upon, because he had found it to vary considerably." Those who read that Mr. Hanley has been

using the Hortvet method for the past 25 years (p. 5 of the Howden-le-Wear leaflet), who know that Hortvet's original paper was published as late as 1921, and who remember that Mr. Hanley told the World's Dairy Congress at Reading in 1928 that he could make nothing of the test, but was persevering with it, may not wonder that he has found it to vary considerably. They may, however, wonder why the evidence of a worker who, on his own showing, could not make anything of a test in twenty years, should be taken seriously after a further five.

In supplement No. 10, in a case in which the test for nitrates had not been carried out by the Public Analyst, Mr. Hanley stated, "I think it is most important; it is the only positive test usually available to a public analyst," whilst in Supplement No. 13, where the test for nitrates was being relied upon by the Public Analyst, Mr. Hanley declared that there was no positive test to detect added water in milk. He explains this in the *Farmer and Stockbreeder* of October 31st, 1932, by saying that "one has to consider the circumstances in each case," and goes on in an attempt to explain them, but there is no mention of any such explanation in the accounts of the cases themselves.

The larger pamphlet of forty-six pages consists of two main portions. The first deals *inter alia* with the variations in the milk of one cow and of a herd of five cows from day to day, the second with the question of what constitutes normal milk; it is maintained that normal milk is the milk of healthy, reasonably well-kept cows. There would appear to be no objection to this definition, provided that it be not assumed that such normal milk necessarily has a normal composition. It is well known that Mr. Hanley objects to the term "abnormal" for a milk which is naturally very poor, but to the reviewers a genuine milk containing, say, 1·7 per cent. of fat and 7·1 per cent. of solids-not-fat is very definitely abnormal, that is, out of the ordinary, and they would be convinced to the contrary with the greatest difficulty.

To the general analytical results very little objection will be taken, but the methods of presenting them are unnecessarily complicated, while the compilation of the tables and graphs must have entailed a tremendous amount of labour, much of which has been wasted. Many Public Analysts will be delighted, even if a little surprised, to know that the variations which Mr. Hanley finds in the milk of a herd of five cows, from day to day for a month, are such as they themselves would have expected, and that they can be used quite profitably in the presentation of their cases in Court. There are, however, many small details and interpolations to which attention must be drawn or serious objection taken.

We read "Aberdeen county is the only authority in Great Britain and Ireland which takes full advantage of the procedure of appeal-to-cows and conducts the process accurately," and later on we find "Public Analysts in general admit they have found the milk of single cows below the presumptive limits, but never a herd." In these connections it would be interesting to know on what evidence such statements have been made.

Mr. Hanley quite cheerfully states that his freezing-points, determined with the Hortvet apparatus, have been corrected by the use of the Raoult corrections, as applied by Monier-Williams, apparently entirely oblivious of the fact that Hortvet especially designed his apparatus to avoid corrections so far as possible,

and that all the American results are given *uncorrected*. This point will doubtless account for the high values given by Mr. Hanley in connection with certain samples of genuine milk. Moreover, in spite of this application of unnecessary corrections, the *highest value* here given for the freezing-point of milk of a hard or of an individual cow is -0.523°C .—a figure which, after the corrections wrongly applied have been replaced, agrees well with those of other workers.

On page 5, Mr. Hanley gives the refraction of the milk of an individual cow low in solids-not-fat as 35.62. Those who have followed the controversy between Mr. Hanley and the present reviewers will see that this one figure practically admits the whole principle for which the latter have been contending.

All Public Analysts should read these pamphlets, from which they will learn (unfortunately only in outline) of a method for the detection of added water in milk by microscopic examination of the ash. If this is the positive test for which the author has been looking, and which he says means so much to him, it should be published at the earliest opportunity; should it prove successful, doubtless Public Analysts will be as complimentary to Mr. Hanley as Mr. Hanley has been to them.

G. D. ELSDON

J. R. STUBBS

EXPLOSIVES. Vol. III. By ARTHUR MARSHALL. Pp. 286. London: J. & A. Churchill. 1932. Price £2 2s.

Fifteen years have elapsed since the publication of the first two volumes of this work (*cf.* ANALYST, 1917, 42, 259, 321). These appeared during the War, and it was consequently not permissible to publish all the developments in explosives which had taken place up to that date. In view of this, and of the large amount of research which has been published since the War, a supplementary volume dealing with the more recent work was greatly needed.

The present volume follows the same sequence of chapters as Volumes I and II, and marginal references to the page-numbers of the original work facilitate reference. Thus the advances in each branch of the subject are readily seen. Numerous references to the literature are given, and a large amount of ground is covered in the space available. The changes which take place in nitric acid at different concentrations and in presence of sulphuric acid are discussed on the basis of Hantzsch's work. Starting from oxonium nitrate in aqueous solution, the acid passes into the pseudo-condition in concentrated form, and in presence of sulphuric acid is largely converted to nitronium sulphate. These transformations have an important bearing on the nitration of cellulose, etc., by mixed acids. The information on the nitro-aromatic compounds, which was rather limited in the original work, has been considerably supplemented. A number of the modern methods of manufacture of compounds used for explosive purposes, including the continuous processes for the manufacture of nitrobenzene, trinitrotoluene, picric acid, and nitroglycerine are described. Newer methods of manufacture of the ingredients of mixed explosives, solvents, etc., are also included. Since the original work a number of new compounds have been introduced as explosives or as ingredients of explosives. The information on manufacturing methods includes some developments in plant construction and the use of acid-resisting materials. It is surprising

however, that so little reference is made to the advances in nitrogen-fixation, which have an important bearing on the manufacture of explosives. A useful feature is the inclusion of numerous tables giving thermo-chemical data, comparative figures for the physical properties of explosives, melting-points, eutectics, etc., as well as valuable statistics showing the relative quantities of different explosives used in this and other countries. Safety precautions are described, and the danger to health resulting from the handling of various nitro-compounds is dealt with in some detail. The methods of testing chemical stability have been considerably amended, as research in this field has been active in recent years. Reference is made to Mayrhofer's modification of the Bergmann and Junk test, the Taliani test, Angeli's acidity test, and the work at Woolwich and by Hansen, Metz, etc., on p_H measurements. The chemical changes which take place in stabilisers during storage are also described.

The sections on analytical methods and physical tests, such as velocity of detonation, sensitiveness, etc., have been amended by the addition of some more recent methods. Finally, an index comprising nearly 4300 entries, and covering the whole three volumes, is included. The volume is readable and is very clearly printed.

R. C. FARMER

VOLUMETRIC ANALYSIS. By G. FOWLES, M.Sc., A.I.C. Pp. xii+202, with 5 figures and 1 coloured plate. London: G. Bell & Sons. 1932. Price 6s.

This volume is intended for the use of students, and, whilst no particular syllabus is followed in its production, sufficient material is included to furnish all that is necessary for many of the higher examinations.

The contents of the book include an introduction; the calibration and use of volumetric apparatus and solutions; the use, theory, and selection of indicators, especially in their application to evaluation of p_H ; acidimetric, alkalimetric, oxidation, iodimetric, and precipitation processes; and a concise but detailed synopsis facilitating reference to the various methods described for determining compounds, radicals and elements.

This volume has many excellent features, emphasis being rightly laid throughout the text on the importance of accuracy (for which reason some widely-used methods are omitted), and the section on p_H values and buffer action is the most lucid that the reviewer has yet seen. The text is unusually free from errors of all kinds, and considerable care has been taken to provide clear and exact descriptions of the methods, which include many that are too infrequently employed, although of undoubted value. The general style of the volume is admirable, the index is exhaustive and accurate, and the coloured plate depicting the colour-changes of seven indicators throughout the whole range of p_H values is highly educative. This work will prove a sound and reliable text-book for students, and, as a summary of some of the more recently evolved methods, is worthy of attention from the practising analyst.

T. J. WARD

MODERN METHODS IN QUANTITATIVE CHEMICAL ANALYSIS. By A. D. MITCHELL, D.Sc., F.I.C., and A. M. WARD, Ph.D., D.Sc., A.I.C. Pp. xi+178. London, New York, Toronto: Longmans, Green & Co. 1932. Price 6s.

This interesting and stimulating little book is intended by its authors to be used as a supplement to the standard text-books, primarily in the training of advanced students, by giving a critical selection of analytical methods "introduced or perfected within the last decade." Some processes of more general application are described first (pp. 1-26); they include volumetric iodate and ceric sulphate methods, the use of Jones's reductor, oxidation-reduction and adsorption indicators, and the analytical application of complex compounds. The remainder of the book is devoted to elements (including many "rarer" ones, even rhenium), radicals, and certain organic compounds (amino-acids, cyanamide products, formaldehyde, sugars, urea), described in alphabetical order. Electrometric and micro-methods are not included.

As stated in the preface, the authors were guided by certain theoretical and practical considerations in collecting suitable methods from the contemporary literature. Judicious selection from among the enormous output of recent years is in itself no mean task; but the volume under review represents a much more extensive undertaking, as the authors have actually tested the great majority of the processes described, and the particulars given in the book specify the conditions (which in some cases differ from the original ones) under which they have obtained the best results. Two examples of the authors' critical attitude may be given: (1) "We did not obtain satisfactory separations by the method of Moser and Niessner [beryllium from aluminium], possibly owing to insufficiently definite specification of the acidity conditions in their description" (p. 43). (2) "This method [titration of halides] is described because of its simplicity and ingenuity, although in our hands it has led to slightly high results for iodide, and has occasionally given erratic results for bromide" (p. 87).

Only in a very few instances does one feel tempted to question the advisability of including a particular process in this useful collection. For example, the reviewer wonders what advantages, if any, the phenylthiohydantoic acid process for cobalt may offer over the usual procedures, in which more readily obtainable reagents are applied.

In the general discussion on tannin adsorption complexes (p. 21), a statement to the effect that tannin is a precipitant for earths in presence of tartaric acid would have added to the usefulness of that section. In particular, the simple method by which a small amount of alumina is separated from much iron might have been added.

The book is attractively produced and practically free from misprints. It is sure to appeal strongly to advanced students and research workers, and equally so to the busy professional analyst, as an epitome of progress in analytical chemistry.

W. R. SCHOELLER

IL POLAROGRAFO: SUA TEORIA E APPLICAZIONI. By GIOVANNI SEMERANO. Pp. 207. Padua: A. Draghi. 1932.

Heyrovský's ingenious method of electrolysis, which makes use of the dropping-mercury cathode and is rendered automatic by means of the polarographic arrangement, has now passed out of its probationary period and has become of practical value. The possibility of studying different problems under conditions exactly reproducible, with a minimum expenditure of time and with the added advantage that the diagrams obtained serve as records of the results, is sufficient to account for the ever-increasing uses to which this method of analysis is being applied.

As the subject is of interest, not merely in such varying branches of study as biology, physics, medicine, pharmacy, mineralogy, and geology, but also in the investigation of sugars, explosives, metals, petroleum, dyestuffs, etc., the bibliography is naturally extensive. It is, therefore, a great convenience to have presented, in a single small volume, the theoretical foundations and the practical details of polarographic methods, together with a number of their applications to scientific and industrial problems.

The book is clearly written, and should be understood without difficulty by those who are able to read simple Italian and have some knowledge of physical chemistry. A bibliography, comprising references to over one hundred papers, is appended.

T. H. POPE

B.D.H. REAGENTS FOR "SPOT" TESTS. Pp. 39, 8vo. Published by The British Drug Houses, Ltd. Price 2s. 6d.

This book contains a list of 36 reagents available for the detection or determination of small quantities of metals or other substances. Some of these reagents are quite common substances, such as resorcinol or hexamethylenetetramine. Each reagent is accompanied by a short description of its uses and references to original papers. Unfortunately, the references are few; if a little more trouble had been taken to make them complete, the value of the book would have been greatly increased.

Since the book gathers together a certain amount of information which is scattered throughout the literature, it should prove useful to analysts, so far as it goes, but one cannot help wishing that it went a little further. Of course, one must recognise that it has a limited aim and is published at a low price, but may one express the hope that one day the authors will give us the English equivalent of Merck's "Reagenz-Verzeichnis"?

NORMAN EVERS