

establish a mobile equilibrium, and is not a reversible or balanced reaction, within our limits of detection.

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NEW BOOKS.

The Progress of Scientific Chemistry. By SIR WILLIAM A. TILDEN. Second Edition. 360 pp. Longmans, Green & Co. 1913. \$2.25.

The merited success of the first edition of this work, published in 1899, has justified the present revised edition in which several new subjects, such as radiochemistry, are included. The majority of the chapters are written from a somewhat old-fashioned standpoint, but are readable and stimulating. The biographical notes and references appended to the several chapters add to the value of the work. GILBERT N. LEWIS.

Chemistry and Its Borderland. By ALFRED W. STEWART. Longmans, Green & Company. 314 pp. Price, \$1.50, net.

This is a very readable and instructive general description of a number of selected topics of recent physical and chemical research. It includes chapters on such topics as the Relations between Chemists and Industry, Chemical problems of the Present and Future. Organization of Chemical Research (in England), The Methods of Chemical Research, etc. Separate chapters are devoted to the discoveries by means of the spectroscope, stereochemistry, colloids, the inert gases of the atmosphere, radium, niton, transmutation of the elements, the nature of the elements, etc. The author is evidently following closely the work of the English school of chemists, and does not hesitate to accept for niton all the properties ever ascribed to it. He does not doubt the transmutation of copper into lithium, as published by Ramsay and Cameron. Madam Curie's described inability to repeat this transmutation is "negative evidence that can hardly outweigh the positive." A bold author makes better reading than an apologetic one, and we do not refer to these facts in critical mood. This kind of book is greatly needed to help keep a very large class of chemists up-to-date and to inspire the aspiring younger generation. It is also very readable to the "near scientist." The author's treatment of his subject reminds one of R. K. Duncan's very interesting and instructive publications.

The author has occasionally fallen into a common didactic error. In this way he has given some impressions which, while they may represent desirable conditions of research, give too much credit to the foresight of chemists and not enough to the utility of their powers of observation. Bacon credited Herodotus with the statement that the Egyptians who deified discoverers, worshipped more animals than men, because the former made most of the discoveries. So also it is still true that many discoveries

are made and then later realized, and that discovery to order and "on the minute" is rare. An interesting case is the author's description of the commercial fixation of atmospheric nitrogen. Of course, he knew how the facts were discovered, but to read his description one might be led to believe that the invention consisted first in finding, by search, the cheapest supply of nitrogen. This was found in the air. This had to be combined with some other cheap reagent. Oxygen was found to be the next cheapest element, so he chose oxygen, and then he had to find some means of combining them. High temperature was known to produce such reaction, and as an electric arc, was a source of high temperature, it was chosen, etc., etc. None of this conveyed impression of aim and end corresponds with the facts. It was discovered, without any preconception or purposeful plan, that an arc produced the combination of the gases of the air, and the reaction was then studied. The important lesson comes to us, in the reviewer's mind, from the fact that quantitative investigation of details of the discovery is what has led to the possibility of its technical application. This investigating spirit it doubtless was, which created for us such chemists as Priestley and Cavendish, to whose observations the present, now logical manufacture of nitric acid from the air is due.

The final chapter deals with chemical research in England, and the present and desirable methods of its encouragement there. The cry is "more money," or endowments, in order to make easier the way of the research chemist. This is also frequently the cry in this country. In both lands the prevailing opinion is that chemists are too poorly paid, that the country's advance would be more rapid if there were more and better paid chemists. Barring the fact that corresponding opinions are held by the clergy, the doctors and lawyers, the masons and the steam fitters of both countries, the contentions are probably true, and Huxley was right when he said, "A Watt, Davy or Faraday is cheap at a hundred thousand pounds." Many authors of note, from Bacon down, have taken the view held by the author. Some of the splendid work now being done by English research men is directly traceable to the present good, but admittedly inadequate methods of encouraging research. Possibly governments, seeing the results of such experiments carried on for years, as is already the case in England, will recognize the value to the country as a whole of increasing its yield of research chemists. The book should help this desirable end, by presenting in readable form, the many accomplishments of pure research in chemistry and its borderland.

W. R. WHITNEY.

Qualitative Chemical Analysis. By W. W. SCOTT, A.M. D. Van Nostrand Co., New York.

The contents of this book are carefully and excellently divided into parts.

The relation between qualitative and quantitative analysis has been clearly brought out. This point, which is very important, is usually lacking in the smaller text books.

The first part contains a very concise description of the physical chemical side of qualitative analysis. One of the characteristics throughout the book is its conciseness. A very large amount of material is contained in a small quantity of print.

There are abundant notes and precautions, which are valuable to the student, distributed through the text. Another pleasing point is the alternative methods that are offered.

Part II contains the bases. Part III gives the analysis of the acids, while the systematic analysis of a substance is given under Part IV. Part V is devoted to tables of reactions.

Perhaps some might desire a little more with regard to the characteristic compounds. However, one must realize that a lot of information is contained in the tables of reactions forming the last part.

To many the absence of equations may prove a weak point.

The use of an arrow, beside a compound, pointing downwards is usually supposed to indicate a precipitate. In this text it is also used to show substances that are almost unionized.

The book contains some errors, that should be corrected, such as thallium being precipitated as $TlCl_3$, the statement that there are no rare elements belonging to the ammonium carbonate group, etc. C. JAMES.

Laboratory Manual of Glass-Blowing. By FRANCIS C. FRARY. McGraw-Hill Book Company. 1914. Pp. vi + 60. Price, 75 cents.

This welcome little manual provides a clear and detailed discussion of the elementary processes of glass-blowing. Much delay is spared and some expense avoided, if some one in the laboratory can seal on a new stopcock or join two tubes by fusion, or fit together a hard and a soft glass tube by ground joints. Such manipulation is well described here, fully and clearly, so that a beginner may be sure of knowing what to do, even if the knowing what to do must be supplemented by hours of practice. The author, whose conception of the proper content of such a manual seems well considered, avoids the description of processes which the amateur cannot be advised to undertake. The reviewer takes a very special pleasure in commending the little book to all who have to use glass apparatus more complicated than beakers and funnels. EDWARD W. MORLEY.

Biochemic Drug Assay Methods. With special reference to the pharmacodynamic action of drugs. By PAUL S. PITTENGER, Instructor in Pharmacodynamics, Department of Pharmacy and Chemistry, Medico-Chirurgical College, Philadelphia. 158 pp. Price, \$1.50. P. Blakiston's Son & Company: Philadelphia.

This manual, the first to be published which takes up this important subject, is a reflection of the interest of physicians and pharmacists in

drugs of standard and uniform potency but, in spite of the title, only physiological assay methods are discussed. The author has given a fair account of the methods and operative technic commonly advocated for the physiological assay of the digitalis group, ergot, epinephrin, pituitary gland, cannabis indica, etc. In addition there is offered some elementary, and, to a degree, very unsatisfactory pharmacology. The manual does not provide adequate knowledge for the training of pharmacists in physiological assay and is too elementary for use by medical students. It may, however, find some use in giving pharmacy students, and others interested in the subject, a reasonable knowledge of physiological assay methods without the necessity of studying pharmacology and pharmacological methods more in detail.

WORTH HALE.

Kinetische Stereochemie der Kohlenstoffverbindungen. VON DR. ARTHUR VON WEINBERG. Pp. viii + 107. 25 figures. Friedr. Vieweg & Sohn: Braunschweig. 1914. Price, M. 3, paper; M. 4, cloth.

It is a well-known fact that ordinary structural and stereochemical formulas take no account of possible intramolecular motions of atoms. The author of this book introduces certain assumptions with regard to rotating and vibrating atomic motions, and applies these to heats of combustion and molecular refractions in connection with various reactions and compounds.

Single bonded atoms are assumed to rotate or swing around an axis, double and triple bonded atoms to vibrate. With heats of combustion, atomic constants are derived which when added, agree very well with the experimentally found values for many substances. These constants, however, must be modified for different classes of compounds, and these changes are pictured as dependent upon the rotational or vibrational motions of the combinations. The volumes occupied by atoms are based upon the molecular refractions. Starting with Eisenlohr's atomic refraction values for single bonded atoms, making certain assumptions with regard to the rotational and vibrational motions of double and triple bonded atoms in connection with the volumes occupied by them, values for the atomic refractions of the latter are deduced which agree with those determined experimentally. The constants so obtained and the principles developed are then applied to the interference of double bonds, aromatic and non-aromatic ring structures, quinones, desmotropy, alloisomerism, color theory, and the asymmetric carbon atom.

Some interesting views are developed in this book, but it may be questioned whether the assumptions used are based upon satisfactory underlying principles. However, a picture is developed of some of the possible ways in which the motions of atoms within molecules may play their part in chemical phenomena.

K. G. FALK.