

## Reviews.

A CONCISE HISTORY OF CHEMISTRY. By T. P. HILDITCH, D.Sc., F.I.C. Second Edition. Pp. xi+276. London: Methuen & Co. 1922. Price 6s.

The writer who craved the indulgence of his readers because he had no time to make his book shorter might well urge this plea if he attempted to put together a concise history of chemistry. In such a work the amount of material to be handled is vast. If the space in which to pack it is strictly limited much of the author's time and thought is necessarily spent in the business of compression. If done well, the work will be as full as the proverbial egg, but, unlike the curate's egg, to be good it must not be merely good in places. How to deal adequately with the varied subject-matter, how to arrange it systematically, and to present it consecutively and logically, in sufficient detail to be accurate and yet concise, to be sparing of words and yet clear and intelligible, and to make of the whole a well-balanced story, of which every section shall be duly proportioned, is a problem of no small difficulty. On the whole, Dr. Hilditch has solved the problem satisfactorily. It is no mean achievement to have succeeded in giving a fairly complete account of the rise and development of chemistry within the space of some 250 small 8vo pages. That the value of his work is recognised is evident from the fact that a second edition has been called for. Presumably it is intended mainly for students or for those who have at least a fair general knowledge of the science. A person practically ignorant of chemistry would not get very far into the book without coming to an absolute standstill. He is not likely to be greatly edified, for example, by the statement (p. 44) that the "application of Planck's quantum theory" has afforded evidence of the structure of atoms when he is nowhere informed in the book what Planck's quantum theory is.

If the book has a serious fault, it is that it attempts too much. It seeks to get more into the pint pot than the pint pot will hold. The "tyranny of space" has, at times, compelled the author to curtail unduly, when to be instructive and illuminating he ought to expand. He occasionally strives to pursue a subject to its logical finish, and then suddenly breaks off with a somewhat halting conclusion, to resume the matter in a subsequent part of the work. Such disconnected treatment is not calculated to afford the reader clear and definite impressions.

But it must be freely acknowledged that the book has many commendable features that the student will appreciate, and these far outweigh such slight demerits as it possesses. Its synoptical tables, for example, contain a mass of information in a very little space. Some idea of the range the work covers may be gleaned from a glance at the index of names and of subjects. The information is generally accurate, but, as might be anticipated, when the amount of material to be dealt with is considered, there are a few slips which, in view of future editions, it may be desirable to indicate. Thus "Sir W. Lockyer" (p. 48) should be "Sir N. Lockyer"; "Bergmann" (p. 48 *et seq.*) should be "Bergman"; "Graebe" is occasionally so printed, but more frequently appears as "Gräbe"; "Pettersen" (p. 190), "Petersen" (p. 194) should be "Pettersson"; "Hofmann" (p. 212) should be "Hoffmann" (the contemporary of Stahl); "Michael" (p. 135) should be "Michaelis"; "Humphrey Davy" (p. 227) should be "Humphry Davy".

Boisbaudran (p. 229) was a brandy-merchant, not a Professor at Paris; Kekulé (p. 232) was Professor at Ghent, not at Geneva; the baptismal name of Cahours (p. 230) was Auguste.

"Reflex" (p. 209) should be "reflux"; "beryllium" (p. 190) should be "beryllum". In this connection it may be noted there is apparently a growing tendency to revert to this name, which originated with Klaproth, in preference to glucinum, from glucine, so termed by Vauquelin, the discoverer of the element. The International Committee on atomic weights ruled by a majority that in their Reports the names of the elements should be those given by their discoverers. The Germans have consequently, no warrant to designate glucinum as beryllium, or columbium as niobium. Strontium was not discovered by Klaproth (p. 225), but by Hope. Its existence in strontianite was surmised by Crawford. Cavendish did not discover hydrogen (p. 224, compare p. 23) or invent eudiometry (p. 224), or study the volumetric composition of nitric acid. He ascertained the qualitative composition of nitric acid, but cannot be said to have determined its "constitution" (p. 67)—using that term in its accepted sense. He certainly never exploded hydrogen and chlorine (p. 216), nor used hydrogen in determining the composition of air (p. 24).

Dulong's name is not specially associated with the oxides of nitrogen (p. 226). A more interesting reference would be to nitrogen chloride, which he discovered in 1812, and by which he was maimed.

It is not strictly accurate to imply that Dalton was the first to enunciate the doctrine of atoms. In connection with his assumption of atoms to explain the phenomena of chemical combination, it may be pointed out that Cavendish in his

Phil. Trans. papers on the Freezing Points of Acids had tacitly assumed the laws of constant and reciprocal proportions in his quantitative determinations of their strengths. Nor is the statement (p. 72) that Berzelius and his co-workers discovered many ores containing chromium, molybdenum, vanadium, and allied metals, justified by the facts. The first notice of a compound of columbium was made by Hatchett and not by Rose (p. 74). Tantalum was discovered by Ekeberg and not by Hatchett (p. 74). There are typographical errors in the formulæ of the cobaltammine chlorides on p. 58, as well as in that of  $\text{PCl}_5$  on p. 118.

Contrary to the implication on p. 42, Marignac, as pointed out by Mallet, was never wholly convinced of the invalidity of Prout's "Law." He was of opinion that anyone who would look impartially at the facts could hardly escape the feeling that there must be some reason for the frequent recurrence of whole numbers among the atomic weights.

Boyle is not generally regarded as a brilliant writer. His style is prolix and tedious in the last degree. One calls to mind Swift's merciless "Pious Meditation on a Broomstick in the Style of the Honourable Mr. Boyle." Priestley, too, is not usually considered to have been a wealthy chemist (p. 208). His riches, like Brotherton's, consisted not in the abundance of his possessions, but in the fewness of his wants. Had it not been for the generosity of his friends—Wedgwood, Watt, Boulton, and others—much of his scientific work would never have been attempted.

T. E. THORPE.

THE EMISSION OF ELECTRICITY FROM HOT BODIES. By O. W. RICHARDSON, F.R.S. Second Edition. Pp. viii+320. London: Longmans, Green & Co. 1921. Price 16s net.

This volume is one of a well-known series of monographs on physics, and deals with the thermionic properties of heated bodies.

It has been known since the early part of the 18th century that all bodies acquire the power of conducting electricity at high temperature and confer this property on the surrounding space. Little systematic work was done on the subject, until Becquerel showed, in 1853, that air at a white heat was unable to insulate under a potential difference of a few volts. Elster and Geitel, Brown, and others continued the work, but, in the absence of a satisfactory hypothesis to link up the facts and indicate further lines of research, the experimentation was of a tentative and exploratory character. At the close of the 19th century, however, the Theory of Ions came to supply the need, and, under the stimulus of the discoveries of Roentgen and Becquerel, was rapidly developed, chiefly by Sir J. J. Thomson, into a coherent theory, which gave a rational connection between the known facts, and indicated new lines of research. Within the last few years the importance of the subject in its technical applications has led to extraordinarily rapid developments, both in the theory and its applications. So much so, indeed, that it has not been possible to deal with the technical developments in this volume, but, as an exposition of recent experimental and theoretical developments, the book is very full and complete.

The subjects treated of include Theory of Emission of Electrons from Hot Bodies—Temperature variation of Electron Emission—The Effects of Gases on the Emission of Electrons—Energetics of Electron Emission—The Emission of Positive Ions by Hot Metals—The Effects of Gases on the Liberation of Positive Ions by Hot Metals—The Emission of Ions by Heated Salts—Ionization and Chemical Actions.

The last chapter, which is of particular interest to chemists, deals, among other things, with the pressure of ions in the gases liberated by the electrolysis of liquid, the ionisation of air which has been drawn over phosphorus, the ionisation accompanying the hydration and dehydration of crystals, the emission of electrons in the presence of an alloy of sodium and potassium in the various gases, and the ionisation of gases by heat.

Copious references to original papers are given throughout. For a full understanding of the book some familiarity with the language of differential equations is necessary.

A. RITCHIE SCOTT.

LABORATORY EXERCISES IN APPLIED CHEMISTRY FOR STUDENTS IN TECHNICAL SCHOOLS AND UNIVERSITIES. By WILHELM MOLDENHAUER. Authorized Translation by LAWRENCE BRADSHAW, D.Sc., Ph.D. Pp. xii+236. London: Constable & Co. Ltd., 1921. Price 12s. 6d.

The author of this book is Privatdozent at Darmstadt Technical School. He mentions, in his Preface, that "a student usually begins technical analysis at a comparatively early stage in his course." Though what would be called an early stage in a Continental course would mean a different period in this country, the fact remains that special branches have sometimes to be taught before an adequate knowledge of general chemistry gives the student fuller powers of utilisation.

The book is, in the first place, concerned with giving directions for the analysis of the following industrial substances: Coal, water, coal-gas, balloon-gas, spent oxide, pyrites, nitroso-sulphuric acid, "oleum," Chile saltpetre, black ash, products of the ammonia-soda process, Weldon mud, Stassfurt potash salts, superphosphate, basic slag, organic manures, iron ores, iron, zinc blende, zinc dust, galena, oils, fats, waxes, soap, glycerin, and lubricants. Following each analytical scheme is some description and explanation of the principles thereof, affording the student some idea of the utility and significance of his laboratory work. Further stimulation of the student's interest is attempted by outlining the manufactures and industries concerned.

The analysis of drinking-water is carried out by methods, some of which are not likely to meet with favour in this country, and the results are inadequately explained. There is the extraordinary statement that nitrous acid is a metabolic product of pathogenic bacteria, and that water containing it may be very dangerous to health. It seems probable that the power of the cholera vibrio to reduce nitrates to nitrites and to produce the latter from the products of proteolysis has made too strong an impression on the mind of the author. However, the book bears every

evidence of sincere attempts on the parts of both author and translator to do their very best to teach a none-too-easy subject. But it may be protested that Hungary does not enjoy a monopoly of water containing sodium bicarbonate. This country also contains such.

WILLIAM PARTRIDGE.

CHEMICAL DISINFECTION AND STERILISATION. By S. RIDEAL, D.Sc., and ERIC K. RIDEAL, D.Sc., M.A. Pp. vii+313. London: Edwin Arnold & Co., 1921. Price 21s. net.

With the recognition of the all-pervading part played by micro-organisms in nature and industry, the necessity for controlling or preventing their action and growth has given rise to a highly specialised department of science, and Drs. S. and E. K. Rideal have done a valuable service in producing a compact, comprehensive and up-to-date résumé of our present knowledge of the subject, in connection with which one of the authors is already well known.

The volume is divided into 14 chapters, and there are author and subject indexes, references, at the foot of almost every page, to current literature, and an excellent bibliography at the end of each section. So thoroughly does this part of the work appear to have been carried out, that it is somewhat surprising to find no mention of the well-known book by Dr. S. Rideal, entitled "Disinfection and the Preservation of Food," in which some of the headings and many whole paragraphs are identical with those in the present volume.

The first chapter is introductory, the next five deal with the specific methods of disinfection applied to air, food, water, etc., and what the authors term "Public Disinfection," *i.e.* the disinfection of rooms, clothes, public buildings and vehicles. Then follow a section on personal disinfection, as employed in medicine and surgery, and another on the destruction of some non-bacterial parasites of plants and animals. After this, about 100 pages are devoted to a consideration of the individual chemicals employed, prefaced by an extremely interesting chapter on the relation between chemical constitution and bactericidal action.

Under the heading "Methods of Analysis and Testing" the last 50 pages are given up almost entirely to the Rideal-Walker test and its modifications. For some reason not apparent, methods of chemical analysis are not dealt with at all. To those who are only interested in the practical side of the subject, the book will afford valuable guidance as to procedure, the methods in use, or which have been suggested, being impartially discussed, and the apparently conflicting results obtained by different workers with the same substance being duly recorded and, where possible, accounted for.

Disinfection is, however, still mainly an empirical process. In the case of some of the commonest preservatives it is difficult to say to what their specific action is due, or even to explain why they should act as preservatives at all. As the authors put it: "The manner in which the normal metabolic functions" of the organisms "are destroyed by the germicide is unknown."

Nevertheless, the mass of observations and the many interesting speculations, here collected and recorded, justify the expectation that some definite laws governing the relations between germicides, antiseptics and organisms will ultimately emerge. Fortunately, on the practical side, most of the factors on which successful disinfection depends are now fairly well defined, and are discussed by the writers in a most interesting and suggestive manner, and the difficulties arising under working conditions and their probable causes, both chemical and physical, are fully set forth. The question of the standardisation of disinfectants, with which one of the authors is so closely associated, is treated with a commendable freedom from bias, and full recognition is accorded to the defects, some of them perhaps insuperable, inherent in the present methods, and to the suggestions which have been made with the object of remedying them.

The chapter on the sterilisation of water is, as would be expected, full and up-to-date, and the valuable experience gained during the war receives here, as in other parts of the book, due recognition. From the practical standpoint some illustrations of the various "dosing" devices which are employed would have been valuable. On the purely theoretical side the subject is presented in a manner which, if not exactly new, has hardly hitherto been attempted in the older textbooks, and the many physical and chemical problems arising in connection with it are dealt with in the light of modern theories.

We have failed to discover any serious errors, but the attribution to Leeuwenhoek of the invention of the microscope can hardly be accepted, in view of the much stronger claims of Cornelius Drebbel, Zacharias Jansen, Galileo, and Lipperhay.

There are a few misprints, of which the following may be noted:—"Naturalised" for "neutralised" (p. 76), "*S. pyg. aureus*" for "*S. pyog. aureus*" (p. 88), "aleinist" for "alienist" (p. 135), "adsorbant" (p. 165), "McConckey" for "MacConkey" (p. 288), and "mumber" for "number" (p. 297); but a more serious blemish is the obvious evidence of haste in production in the form of slipshod writing and a tendency to use ultra-scientific phraseology where simpler language might be employed. Fortunately the authors' meaning, though sometimes obscured, can generally be made out, but accuracy of expression is often lacking, and from the literary point of view the book leaves much to be desired.

The arrangement is excellent, and the type and paper all that could be desired.

CECIL H. CRIBB.

DICTIONNAIRE ANGLAIS-FRANÇAIS-ALLEMAND DE MOTS ET LOCUTIONS INTERESSANT  
LA PHYSIQUE ET LA CHIMIE. By R. CORNUBERT. Paris: Dunod. 1922.  
Price 42fr. net.

This dictionary, as originally published, dealt only with French and German physical and chemical terms; it has now been enlarged so as to include the corresponding English words. Its plan is simple and effective, and makes reference an easy matter. On each page the entries are arranged in three columns—English,



French and German—with the key words printed in bolder type according to their alphabetical position in any of the three languages. For example, when a word is practically the same in each language, such as, for instance, “Refractometric,” there are three parallel entries in bold type. Again, “Eau” is printed prominently in its proper position under “E,” whilst “Water” and “Wasser” in the parallel columns are in small type; and so on. This arrangement not only saves space, but is also much more convenient than having each language placed in a separate section of the book.

The list of chemical and physical terms for which the respective equivalents are given is copious; it includes chemical substances, apparatus and parts of apparatus, physico-chemical measurements, and details of processes involved in chemical and physical methods. There are also very full lists of English and German abbreviations, but the English student will miss the list of the analogous French abbreviations; it would be an improvement if these were added in the next edition.

The English translations of the French and German terms are, in general, excellent, especially in the case of the more technical words and phrases, but for some of the more common terms unusual, obsolete, or even non-existent words are given. For instance, “to degradate” would possibly have been a useful verb, if it had ever been acclimatised. “Fugacious,” it is true, is to be found in English dictionaries, but, fortunately, the influence of Dr. Johnson on the English language has waned, and we now shrink from using such a word.

Apart from a censorship of strange words, more attention might, with advantage, also have been given to the proof-reading of the English columns, for there are numerous misprints, some of which may puzzle a French or German student. For example, we find “purping nut oil” as the translation for “Curcasöl,” and a remarkable hybrid “dog-cat” as the equivalent for “graisse-de-chien.”

But all these are minor blemishes, which can be readily removed from the next edition, and which do not materially detract from the value of the work; and, regarded as a whole, the dictionary may be thoroughly recommended as a trustworthy aid to the English chemist.

When the enormous labour involved in collating the words and phrases in the three languages is taken into consideration, the price at which the book is published must be regarded as exceptionally reasonable.

EDITOR.