temperatures much above 150°. Phosphoric acid has proved to be an excellent substitute, for it does not fume at temperatures as high as 350°.

The preparation of the bath consists in heating orthophosphoric acid to the highest temperature desired, in order to produce the nesessary concentration. As phosphoric acid attacks ordinary glass the use of some resistance glass, such as Pyrex, is essential. Even Pyrex, however, is etched, but so slowly that the same container may be employed for several months before its transparency is seriously impaired. On standing, the acid becomes somewhat clouded, owing to absorption of water from the air, but the addition of a further quantity of water with subsequent reheating will relieve this opacity. Any discoloration, moreover, may be destroyed by introducing a few crystals of sodium nitrite.

RADCLIFFE COLLEGE,
CAMBRIDGE 38, MASS. ALICE GRAUSTEIN

Correction.—In my article on Friedel and Crafts' reaction in the September, 1920, JOURNAL, the following corrections should be made: p. 1873, line 10, read 6-carbethoxy-2-nitrobenzoic acid; p. 1873, line 13, read 2-carbethoxy-3-nitrobenzoic acid. WALTER A. LAWRANCE.

NEW BOOKS.

Radioaktivitaet. By STEFAN MEYER AND EGON R. v. SCHWEIDLER. B. C. Teubner, Leipzig, 1916. 540 pages. 87 figures. 23 × 15 cm. Price, about 170 marks.

To scientific men, one of the most unfortunate results of the recent European war was the serious interruption of international intercourse in all branches of science. Although Meyer and v. Schweidler's Radioaktivitaet appeared in 1916, it has not been generally available in this country and can hardly be said to be so now, owing to the unfavorable regulations imposed in Germany and Austria upon the export of scientific literature. The interests, however, attaching to this exhaustive treatment of a subject which, with ever increasing force, impresses upon us its far-reaching importance to various branches of science, will justify a belated review.

The rapidity of the development of the subject of radioactivity, in spite of the retarding influence of the war, is clearly demonstrated by the fact that the progress of the past 4 years has opened entirely new fields and has left the treatment of others far behind the present status of development. Even during publication, this difficulty was recognized by the authors and was taken care of, as far as possible, in a number of additions to the text in the form of "Nachtraege."

The authors state that the contributions of Germany and Austria to the science of radioactivity invite a German treatise, although it parallels the standard English and French texts of Rutherford and Mme. Curie.

One of the further objects of the work is to present the researches carried out in Vienna since the foundation of the Institut für Radiumforschung in 1910. No one is more competent to undertake this than Stefan Meyer, under whose able direction the work has been carried on with such marked success, with the able assistance of v. Schweidler, Hess, Hoenigschmid, Paneth, Pzribram, v. Hevesy, Kailan, Lawson and a host of others. The publications of the Institute, now totalling, more than 125, attest to the character of the researches that have been so rapidly and thoroughly carried out.

The subject is treated under the general divisions: the processes of radioactive transformations, the processes of radiation, the effects of radiation, methods of measurement, the radioactive substances, and radioactivity in geo- and cosmic-physics. Besides the topics usually treated especial attention has been devoted to the newer developments in the field since the appearance of the works of Rutherford and Mme. Curie, and also to the geophysical and physiological phases of the subject. Very interesting bits of the history connected with the Austrian deposits and the local development of the radium industry are presented for the first time.

Naturally, much attention is paid by the authors to the recovery of radium from pitchblende, as practised by the Austrian Government. These details are of interest in the United States, although the recovery of radium from pitchblende has never been economically successful here, and has been superseded by the development of the recovery from carnotite by different methods, on a scale that would probably be impossible from the European deposits hitherto discovered.

It is interesting to observe that the "circulation method" of determining radium by its emanation content is described as standard practise. In the United States this method has been almost wholly replaced by the "boiling-off method," originated by Boltwood, and which, in many cases, can be modified by employing a fusion method for the liberation of emanation.

A notable feature of Meyer and v. Schweidler's text is the completeness of the citations to the literature. We have become accustomed to the introduction of literature references at the close of individual chapters, but the authors have gone a step farther in presenting citations at the end of each section, which are frequently as imposing in number as could be expected from an entire chapter of the ordinary text. No detail has been so minute as to escape the attention of these painstaking authors.

Without doubt, Meyer and v. Schweidler's treatise takes a place as one of the standard and indispensable works on radioactivity. It is to be hoped that conditions will soon change so that it may become available to American readers in the measure which it richly deserves.

S. C. LIND.

A History of Chemistry from the Earliest Times. 2nd edition. By the late JAMES CAMPBELL BROWN, D.Sc. (Lond.), LL.D. (Abdn.), Professor of Chemistry in the University of Liverpool. P. Blakiston's Son & Co., Philadelphia, Pa., 1920. xxix + 544 pp., 1 portrait and 106 figs. 14.5 × 23 cm.

This posthumous work, compiled from the author's lecture notes and issued in the form of a memorial volume, is already familiar to teachers and students of the history of chemistry, and is proof of educational value. The present edition is practically an unrevised reissue of the first, which was reviewed in THIS JOURNAL, **35**, p. 1916 (1913). A re-reading of the work and a comparison of the 2 editions suggests to the present reviewer a reiteration of the commendations and critical suggestions already made.

To these former criticisms a few remarks may be added. The scope of earlier short histories of the science was practically limited to the narrative of modern progress in solving the problems of chemical composition. They lacked on the one hand that historical perspective which is to be attained only by a serious study of early chemical practise and a critical examination of the development of ancient and mediaeval thought concerning qualitative change in nature; and on the other hand that completeness for which an adequate treatment of modern achievement in atomistics and chemical energetics is necessary. The present work remedies in some degree the first of these defects, although inadequately. Its most obvious faults are those which would naturally characterize any collection of lecture notes: omission here, over-elaboration there; in short, a lack of balance, punctuated by occasional inconsistency and ambiguous implication. Since the total effect of these shortcomings is—ignoring any more serious influence—to render somewhat confused an exposition which might with the author's supervision have been made as lucid as it is readable, it is to be profoundly regretted that the "oral additions and comments with which he was wont to supplement the written notes have been for the most part lost."

The work is, nevertheless, an advance in the right direction. The author refreshingly acknowledges the mental competence of the alchemist, and is fully aware of the tremendous value to modern science of that Greek speculation which underlay the more subtle alchemical theorizing—a value conclusively demonstrated by Greek astronomy and distinctly foreshadowed in Greek physics, but lost to ancient and mediaeval chemistry in the recrudescence of primitive mysticism which at the beginning of our era engulfed the Greek world, and perverted its intellectual tendencies. He has, however, not taken the trouble to present more than a very superficial view of this philosophy in either its ancient or mediaeval aspect; and thus fails to supply any adequate basis for a proper understanding and appreciation of the iconoclastic thinkers of the 17th century to whose acumen we moderns are indebted for a realization of the proper aims of chemical research, and for rational definitions of its fundamental

concepts. The same sort of limitation characterizes also, though much less strikingly, the author's treatment of later periods of chemical development. The whole work, for lack of the sequential coördination which a more philosophical treatment of the subject alone could supply, leaves upon the reader's mind a sense of rich confusion, from which there emerges no clear impression of that steady progress in thought and method by which our rationally organized science of chemistry was developed out of an ancient Sacred Art. The author thus misses the opportunity of making a really important, as distinct from a useful contribution, to the history of chemistry. His thought, so far as it is expressed in these pages, is nevertheless both judicious and suggestive. The book is very readable; and as a convenient repository of fact and reference is of unquestionable value. FREDERICK BARRY.

Practical Chemistry, Fundamental Facts and Applications to Modern Life. By N. HENRY BLACK, A.M., Science Master, Roxbury Latin School, Boston, Mass., and JAMES BRYANT CONANT, PH.D., Assistant Professor of Chemistry, Harvard University. The Macmillan Company, New York, 1920. x + 474 pp., 257 figs., 12.5 × 19.5 cm. $2.00.

We have read the book by Black and Conant with a great deal of pleasure. It seems to us an extremely valuable book put up in a very interesting way, and that there should be a very large field for it. In looking over a number of other texts of this same kind, we have found that the first pages are extremely interesting and appeal to the imagination of the student. However, this book appears to keep that same spirit throughout.

The general appearance of this new work is plain but impressive; the preface is clear and concise, the illustrations are modern, up-to-date, and many of them new, and as far as we have observed, have not been used in any book of this kind. The diagrams are very explicit and to the point; and the pictures of famous chemists are well selected. The diction is simple and well worded; the laws are well illustrated, and the summaries and questions at the end of chapters are well selected; and should aid the student in his review, as well as stimulate interest in the subject. Fig. 5 on p. 6, "A chemical laboratory in the Ford Motor Plant," is valuable in that it calls the student's attention to the dependence of large manufacturing firms on chemistry.

Modern texts seem to differ from the authors' as to the date of the discovery of oxygen. It seems to us very well established that neither Priestly nor Scheele was the first to prepare the gas or have knowledge of its properties. Chapter V on gases and their measurements is ably discussed. Fig. 64, "U. S. Plant at Muscle Shoals, Alabama, for producing liquid air and separating nitrogen," is a recent one and very instructive. On p. 95 the definition of a molecule "smallest particle of matter which can exist in a gaseous state" seems to us rather odd. On

p. 144, under "Valences of common elements and radicals," we would suggest that arsenic be added to the trivalent group. The solubility curves on p. 152 are instructive, and we think should be used in a book of this kind.

Chapter XV on Solution is ably written and clearly stated. The pages on colloidal solutions and the application of colloids are without doubt the finest we have seen. Some authors would question the following statement made by the authors of this book regarding the electrolysis of sodium hydroxide: "The sodium atoms which are formed at the negative electrode immediately react, forming more sodium hydroxide and hydrogen;" but this explanation is no doubt the best to use with the beginner.

We think ionization should be taught in a beginner's course; and the subject is well treated in this text. The industrial chart on p. 205, showing the relation between some of the more important chemical processes, their raw materials, and products, is very instructive. Chapter XXIII, on the simpler compounds of carbon, contains a mass of useful and interesting data that every high school student should know.

The Mond process on p. 407 should also include the separation of nickel from cobalt. On p. 411, the uses of zinc, as given, are too limited. Its use as shingles, cornices, gutters, statues, etc., was well illustrated by the products of the New Jersey Zinc Company at the recent Chemical Exposition in New York. Fig. 182, "A U. S. Government experiment showing the effect of fertilizers on potatoes," seems to us a bit misleading; it gives the impression that "no fertilizer" is better than "one lacking potassium salts."

The cloud attack with chlorine, on p. 317 is a fitting picture. Chapter XXVI discusses radium and radioactivity very well indeed, giving, it seems to us, just enough fact to leave the student a bit hungry to learn more of the subject.

Thanks are due to Mr. Joseph A. Babor of this Department for his coöperation in the criticism. W. L. ESTABROOKE.

"In selecting the material for this book we have tried to include only those topics which young people can readily grasp and will find useful in their everyday life. In doing this we have covered the topics suggested by the College Entrance Examination Board for admission to colleges and scientific schools. * * * * We have tried to introduce theories when and insofar as they would help the student to understand the essential facts of chemistry. In order to focus attention on what we consider these fundamentals, we have placed at the end of each chapter a summary, so worded as to be easily remembered and applied. * * * * * * It is hoped that some students will want to continue their study of chemistry either at school or at home. To stimulate and perhaps to guide these efforts at independent work, we have suggested at frequent intervals in the book some suitable topics for further study, together with some leading questions."

These sentences from the preface show what the authors had in mind as leading ideas in the preparation of the text. Certainly every one will agree with the first—except to the "useful in their everyday life." Much of the training that chemistry should give can be of no possible *use* in the usual meaning of the word. In the second the plan of the work is vitiated by just the amount, consciously or unconsciously, that the authors have been influenced by the idea that they were making a text to conform to suggestions of any board whatsoever. The third is beyond criticism, but when it comes to the fourth one can only object. If one or two summaries had been given and the student required to make those for the other chapters they would have served admirably to give him training in that almost wanting ability to select essentials, condense chapters and use logical arrangement of matter in brief, concise sentences. Had this plan been followed, the book could have been shortened by more than 30 pages and made a much better text. In mathematics only one or 2 problems are solved. The student must work out his own salvation on the others. So should it be in chemistry. The last 3 sentences are good. The questions and topics for further study are, on the whole, admirable, and there is a short list of books in the appendix that would help if the library could get them.

The text is on the ordinary orthodox plan, followed by most writers for the last 20 years; 2 chapters of general ideas, then hydrogen, oxygen, gases and their measurement; water and its composition; oxides of carbon; nitrogen and the atmosphere; theory of atoms and molecules; symbols, formulas, and equations; calculations, etc., etc. Later come non-metals and then metals. There is nothing to make it preferable to any one of a dozen other texts now in use. The subject matter is good, cuts with a few exceptions, actually illustrate, and the index is adequate. It cannot be finished by the average class in a year, but that will enable the teacher to select what seems to him to be essential, and to vary his work from year to year.

In some minor matters the book is not so satisfactory. "Properties" is defined on page 7 as wholly physical, yet the text is crowded with repetitions of "physical and chemical properties;" "metallic" occurs something like 75 times, where its omission would be better; 3 metals, manganese, potassium and sodium are given in the index under the caption "Metallic," and "Chemical" is also overworked. "Lime is an alkali which is chemically known as calcium hydroxid." "Helium can be *made*," "Metallic potassium is *made*," "changing sodium chlorid into metallic sodium," "formation of hydrogen" are only a few examples from dozens which might be quoted. "This (hydrochloric) acid is treated with an oxidizing agent which oxidizes the hydrogen of the acid to water and sets the chlorine free." (Hypochlorous acid) "is unstable and breaks down easily into oxygen," are other samples of loose and unsatisfactory language. A laboratory guide is in press. C. M. WIRICK.