

REVIEWS OF BOOKS.

Theory of Alternating Current Machinery. By A. S. LANGSDORF.
(London, McGraw Hill Publishing Co. Ltd., 1937. Pp. xviii + 788.
Price 36s.)

Professor Langsdorf's well-balanced treatise on alternating current machinery is admirably calculated to dispel the still-existent superstition

that there is something difficult and mysterious about alternating-current phenomena as compared with the simplicity of direct-current theory and practice.

There isn't; and Professor Langsdorf, who begins right at the beginning of the story with a simple loop rotating in a magnetic field and a dexter hand depicted with thumb, index and second fingers mutually at right angles, demonstrates this very clearly.

The mathematical knowledge demanded is no more than is contained in a few simple differential equations—the author devotes a chapter to the explanation of such complex-quantity theory as is necessary for his exposition. By a judicious use of graphical and analytical methods he develops the theory of single- and polyphase-circuits, and discusses, in considerable detail, the transformer, the synchronous generator, motor and converter, asynchronous machines, polyphase and single phase induction motors, the induction generator and commutator motors.

The book can be thoroughly recommended as giving, in relatively brief compass a clear and authoritative account of modern alternating current machinery.

A. F.

Low Temperature Physics. By M. AND B. RUHEMANN. (Cambridge University Press, 1937. Pp. ix and 312. Price 18s. net.)

Recent years have seen a remarkable increase in the attention paid to low temperatures both in industry and in the university laboratory. On the one hand there is the considerable extension of domestic refrigeration, the widespread use of solid carbon dioxide as a portable refrigerant and the large-scale preparation of pure gases by the fractionation of easily liquefied mixtures. On the purely scientific side one may notice the establishment all over the world of laboratories specially equipped for research at the lowest temperatures. In some of them it is even possible now to carry out physical measurements at temperatures only a few thousandths of a degree above the Absolute Zero. The technique is necessarily still a very special one and but few workers can gain first-hand knowledge of the properties of matter at the lowest temperatures.

There is therefore a real need for a comprehensive book which will enable the general reader to become familiar with the ever expanding results of low temperature physics. A hearty welcome can be extended to this attempt to supply the need. The book is concise and eminently readable; the authors address their work "to physicists specialising in other fields and more or less passively interested in low temperature work and students who have not yet concentrated on one particular branch of physics." They deem it preferable that the book shall be "too elementary for the former rather than too advanced for the latter."

The book opens with an interesting account of general low temperature technique under the headings of early history, industrial methods of gas liquefaction, large-scale cryogenic apparatus as typified by that of the Kamerlingh Onnes Laboratory of the University of Leiden, small-scale apparatus as devised by Simon and the measurements of low temperatures. The theory and practice of industrial fractionation of liquefied gases and the solid-liquid equilibrium in pure substances and binary mixtures are dealt with in the next two chapters.

The largest section of the book describes the investigation of the solid state at low temperatures—X-ray determination of the structures of liquefied gases, specific heats, the possibility of molecular rotation in crystal lattices, deviations from Debye's formula for specific heats and the phenomenon of the λ -point. The latter phenomenon and Ehrenfest's discussion of it in terms of phase transformations of the second order are excellently presented for the first time, as far as the reviewer is aware, in book-form.

The brief chapter on paramagnetism which follows can hardly be said to present an adequate summary of the state of this rapidly growing subject at the time of writing. The next section on the newest triumph of low temperature technique, the production of temperatures below 1° K. by adiabatic demagnetisation of paramagnetic salts, will be read with especial interest by the general reader to whom the book is addressed. The book closes with short accounts of electrical and thermal conductivities of metals and of supraconductivity.

It is unfortunate that though the book appeared at the end of 1937, it deals only with work published before December, 1935. Much progress has been made in the intervening years, and many obscure points have been elucidated. The absence of any index is a serious omission which should be remedied in any future edition.

L. C. J.

- (1) **Tables Annuelles de Constantes et Données Numériques : Table des Matières des Volumes VI-X Années 1923-1930 ; 1937.** (2) **Tables Annuelles Internationales de Constantes et Données Numériques. Volume XI (Années 1931-1934), 1 Partie (Chapitres 1-25) ; 1937.** (3) **Deuterium and Deuterium Compounds.** By G. CHAMPETIER, Mlle. BONNET and M. MAGAT, with preface by H. C. UREY, 1937. (4) **Electromotive Forces.** By H. S. HARNED, and **Oxidation-Reduction Potentials.** By G. ÅKERLÖF, 1937. (5) **Molecular Spectra Molecular Structure, Part I, Diatomic Molecules.** By V. HENRI, 1937. (6) **Molecular Spectra Molecular Structure, Part II, Tri- and Polyatomic Molecules.** By V. HENRI, 1937. (7) **Faraday Effect.** By M. SCHERRER. **Magnetic Birefringence, Electric Birefringence.** By A. COTTON and J. RABINOVITCH. **Photoelectricity.** By G. A. BOUTRY, 1937. (8) **Combustion and Detonation in Gases.** By P. LAFITTE, 1937. Paris: Hermann et Cie. New York: McGraw Hill Book Co. Inc.

The index to Vols. 6-10 of the *Tables Annuelles*, the first part of the new form of the tables, and six monographs not yet included in any volume, are listed above. The first part of the new volume, containing descriptions in French and English, deals mainly with thermochemistry, dielectric constants and dipole moments, and gives a very complete survey of quantitative data on these and other subjects included in the volume. Curves are given when necessary. The monographs give very useful surveys of the subjects with which they deal, with references to the literature. It is clear that the publication of these annual tables in the new form, and of the monographs, will serve a very useful purpose in bringing the latest results in various fields of research up to date and in supplementing other large collections of physico-chemical tables.

J. R. P.

Measurement of Radiant Energy. Edited by W. E. FORSYTHE, assisted by various contributors, 1937. (McGraw Hill Publishing Co. Ltd., London. Pp. xiv + 452. Price 30s.)

This book possesses the merits—and some of the defects—attendant on a volume produced by team work. It is difficult, perhaps impossible, to achieve that unity of treatment and outlook possible when a subject is handled by one author—and there are marked inequalities in the scope of certain of the chapters—but that loss is more than compensated by the precision, authority and freshness of the information conveyed in articles written by a body of contributors so distinguished as those who have collaborated in the production of this work.

The book is, primarily, a work of reference for students and technicians engaged in the measurement of radiant energy. It is the first duty of a reviewer to acquaint his readers with the contents of a volume which covers so wide and varied a field and this may best be accomplished by listing the headings of the fourteen chapters which make up the book. Here they are: Fundamental Concepts and Radiation Laws, Sources of Radiant Energy, Analysis of Radiation, Spectrometric Instruments and their Adjustments, The Spectrometer as an Optical Instrument, Radiometry, Measurement of Spectral Radiation by means of the Photoelectric Tube, Measurement of Radiant Energy with Photographic Materials, Densitometers and Microphotometers, Galvanometers for use in Measurement of Spectral Radiation, Spectrophotometry, Optical and Radiation Pyrometry, Photometry and Special Problems.

The articles are, for the most part, fully documented—there are over five hundred references to the literature—and the book is one which is destined to have a heavy load factor; it is certainly not in the class that is set aside to gather dust on the library shelves.

A. F.

Clowes and Coleman's Quantitative Chemical Analysis. XIV. Edition by D. STOCKDALE and J. DEXTER, 1938. (J. & A. Churchill, Ltd., London. Pp. xiv and 617. Price 18s. net.)

The editors have performed their task well. This edition has only twelve more pages than the last, but by careful revision and by the use of a slightly smaller type it embodies quite considerably more material. The fact that so many fresh editions are continuously required is sufficient indication that Clowes and Coleman retains its freshness.

One criticism only we venture, from memories of our youth. If line diagrams were used in place of half-tones, it would be possible to avoid the use of heavy glazed paper and reduce the weight of the book very considerably. The physical burden of books carried to lecture room or laboratory is necessarily heavy, but by such simple means it could be much relieved. Moreover, many of the diagrams (*e.g.*, a photograph of a box of weights) would be quite unnecessary.

The present generation will as surely and safely rely on Clowes and Coleman as have past generations.