

BOOK REVIEWS

Matière et Atomes. Second edition. A. BERTHOUD. Pp. 324, fig. 28. Gaston Doin and Cie, Paris. Price, 26 fr.

The claim of this little book on the attention of readers of the Physical Review is principally based on its pedagogical and educational significance. It forms one of the series *Encyclopédie Scientifique* issued for the consumption of the general public in France. It would be well if in America we could have similar works at such a modest cost without the usual expensive binding and "fixings" but with good, well-written, and reasonably up-to-date texts.

The ground covered is the standard material of atomic physics—x-rays, isotopes, radioactivity, Bohr theory and the periodic system, and an introduction to wave mechanics. The treatment is in the main descriptive but is adequate and to the point. This is one of the best elementary introductions to modern physics which the reviewer has seen.

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Fortschritte und Probleme der Atomforschung. J. STARK. Pp. viii+112, 11 figs. Verlag von Johann Ambrosius Barth, Leipzig 1931. Price RM 4.80.

Professor Stark has collected in this volume three lectures and three reprints of former articles. These six items make up the six chapters of the book as follows: I. The important problems of present-day physics. II. Contributions to optics as related to atomic structure. III. New phenomena concerning atomic structure and light-emissions. IV. The "axial" nature of the valency-field of carbon and nitrogen atoms. V. Causality and the behavior of the electron. VI. The dogmatism of the modern theories of physics. These lectures constitute on the one hand a refutation of wave-mechanics, which Professor Stark does not like at all and on the other hand they constitute an attempt to present his own ideas of atomic structure, the process of light-emission and of chemical valency. The mathematic theory of the wave-nature of matter is completely wrong in the author's opinion and his adverse remarks are directed mainly towards Professor Sommerfeld who appears as the principal exponent of Schroedinger wave-mechanics. However it appears to the reviewer that Professor Stark has little to offer in place of the present physical theory of the nature of matter. He completely ignores the quantitative results that have been obtained. He offers only qualitative notions and arbitrary pictures of "axial" atoms. One wonders if the author will not change his views when he becomes acquainted with the work of Heitler and London, Slater and Pauling on the nature of chemical valency as portrayed by quantum mechanics. (See following review).

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Atomstrukturelle Grundlagen der Stickstoffchemie. J. STARK. Pp. v+44, 93 figs. Verlag von Johann Ambrosius Barth, Leipzig (1931). Price RM 3.90.

This monograph consists of two parts: I. General concepts of atomic structure and atomic binding and II. Modes of combination of the valency-electrons of the nitrogen atom. The author presents his ideas of the nature of the atom, for which he accepts the Rutherford model but modifies it in the sense that he considers the surface of the atom to be so constituted that only certain positions of the valency electrons on the surface are possible. To maintain the electron in equilibrium he postulates an "inner kinetic" force besides the electric force acting on the electrons. While he does not mind to postulate new forces whenever necessary he refutes all modern physical theories, especially wave-mechanics, and offers, however, only qualitative notions in their place. The text is profusely illustrated with detailed pictures of chemical compounds such as benzene and especially nitrogen compounds. Professor Stark accepts the chemist's notion of directed valency and his views are no advance in thought beyond the well

known theory of octet chemistry as discussed by Professor G. N. Lewis. It is hoped that Professor Stark can render a service to physical and chemical theory by his criticism for he may force the proponents of wave-mechanics to consider their own ideas still more carefully. (See preceding review.)

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General Physics for Home Economics Students. FRED G. PERSON. Pp. xx+298. John Wiley and Sons, New York, 1931. Price \$2.50.

This text aims to give an abbreviated, college course in physics suitable for students of home economics. Part I (146 pages) treats the mechanics of solids and liquids and contains a short chapter on "Water for the Home" and another on "Sewage and its Disposal". The treatments of mechanics differs from that in an ordinary high-school text mainly perhaps in that it describes and illustrates somewhat more completely a few devices used in the home. Part II (123 pages) treats heat, electricity, sound, and light in a very incomplete and elementary manner.

The figures and drawings, with but few exceptions, are good. Nearly every chapter is followed by a set of good problems. Many discussions and descriptions are given in terms unintelligible to the student, and the text is marred by too many misstatements such as "A charge of electricity stationary or moving is always accompanied by a magneic field, . . ."; "An ordinary 25-watt tungsten lamp burns 25 watts per second, but in computing power consumption the lamp is allowed to burn one hour and the measure is called 25 watt-hours". This text cannot be considered as meeting the standard of any kind of a college course in physics.

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Molecular Rays. RONALD G. J. FRASER. Cambridge Series of Physical Chemistry. Pp. 204+x, 78 figs. The Macmillan Company, New York, 1931. Price \$3.75.

This monograph discusses the technique of production and measurement of molecular rays and their application as a tool in various fields of investigation. Written from the experimental standpoint it presents in some detail experimental results obtained by the use of molecular beams but makes no attempt to discuss their theoretical background, except insofar as is necessary for an understanding of the experimental technique. The book will be of interest to those who are engaged in research involving the use of molecular rays, as they will find in it many details of method and technique previously available only in brief papers, and to the scientist specializing in other fields who is interested in a summary of results obtained by this method and an indication of its possibilities. The author has himself contributed experimental results of some importance and has spent some time in Professor Stern's laboratory. His firsthand acquaintance with the problems which he discusses is evident. Occasionally the book suffers by the omission of significant details—but on the whole it is excellent both in its exhibition of the possibilities of the method and its discussion of technique. There is an interesting foreword by Professor Stern.

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The Theory of Spherical and Ellipsoidal Harmonics. E. W. HOBSON, Pp. xii+500. Cambridge University Press. The Macmillan Co. New York 1931. Price \$11.50.

This is probably the most complete treatise on the subject which has yet appeared. The only volumes of at all comparable scope were written by Heine at much earlier dates. What particularly distinguishes Professor Hobson's monograph from the usual, briefer books is the great care and thoroughness with which spherical harmonics of unrestricted (i.e., non-integral) degree and unrestricted argument are studied. In fact, almost half the volume is devoted to these harmonics of very general type, which are, of course, not needed for the commoner physical problems, but which are by no means entirely devoid of applications. The opening four chapters are devoted to the more usual theory of the harmonics of integral degree, and

present this material in a very lucid and readable fashion. A tremendous number of formulas obeyed by the harmonics, and many alternative ways of representing them are included. In a volume as complete as this, it would have been very appropriate to include the formulas expressing the transformation of associated Legendre functions under a rotation of axes. Instead only the more restricted and usual transformation relations for Legendre polynomials are given, called the addition theorems by Professor Hobson. The more general formulas have been given by Wigner, Kramers and Ittmann, and others, and their coefficients are of particular mathematical interest as the "Darstellungskoeffizienten" of the rotation group. These coefficients also prove to be the same as the wave functions of the symmetrical top and are intimately related to the Lamé functions for surfaces of revolution. The last chapter is upon ellipsoidal harmonics. It would here perhaps have been mentioned that the researches of Wang on the asymmetrical top have shown that the four rather unsymmetrical determinants for determining the Lamé functions can be very compactly and symmetrically expressed in terms of a single determinant which permits a fourfold factorization.

To summarize, the volume may be recommended as an unusually complete, and lucidly written treatise on the properties of harmonics. References to the literature and good indices are included.

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