Book Reviews

Textbook of Physics. R. Kronig, Ed. In collaboration with J. de Boer, H. C. Burger, P. H. van Cittert, C. J. Gorter, A. C. S. van Heel, P. van der Leeden, and G. J. Sizoo, with biographical notes and tables by J. Korringa. Interscience, New York; Pergamon, London, 1954. xiv + 855 pp. Illus. $10.

The original edition of this book was written during World War II to satisfy the need for a textbook in the Dutch language that would cover the entire field of physics. Since the book was the result of the combined efforts of outstanding men in creative research, it is not surprising that it was an exceptionally clear, concise, and accurate exposition of undergraduate physics. The book was received enthusiastically, a third printing was necessary after only 4 years, and the authors were therefore encouraged to prepare an English translation. This comprehensive survey of physics has thus become available to a much larger number of students.

Textbook of Physics is divided into 12 principal sections and concludes with 30 pages of interesting biographical notes and a table of natural constants, both prepared by Korringa. The first five sections present the phenomenological parts of physics. The introduction (22 pp.) by Kronig contains a brief, well-written summary of the mathematical tools of physics. The section on mechanics (113 pp.) by Van der Leeden covers the conventional material on dynamics of particles and rigid bodies in a rigorous condensed treatment (63 pp.). The remainder is allocated about equally to gravitation, elasticity, and fluids. The following section on vibration and waves (51 pp.) by the same author is about evenly divided between the theory of vibration and the mechanism of wave propagation. Several topics of this section, such as forced vibrations of a damped system and group velocity in wave propagation, are more advanced in nature and, hence, are presented in small type.

The fourth section on electrodynamics (153 pp.) by Sizoo is an excellent treatment beginning with the simple concepts of charge, current, and voltage, and leading logically into the more advanced concepts of electric and magnetic fields, alternating currents, electromagnetic waves, and theory of relativity. A summary, which compares the formulas for the electric field with those for the magnetic field, at the end of the section has especially great pedagogic value. The fifth section on physical optics (88 pp.) by Van Cittert is a fairly standard treatment of interference, diffraction, and polarization phenomena.

The next three sections present the atomistic parts of physics. Section six on atomic structure (50 pp.) by Kronig discusses cathode rays, radioactivity, Bohr's postulates (but not Bohr theory), light quanta, and matter waves. Line spectra, x-ray spectra, and band spectra are introduced in a logical fashion by a short discussion of quantum mechanics. The treatment of the interaction between radiation and atoms (4 pp.) and nuclear physics (5 pp.) are unfortunately brief. Section seven on atomic theory of heat (70 pp.) by de Boer covers kinetic theory (*including transport phenomena*), crystal structure, specific heat of solids, and the theory of radiation. Section eight on atomic electricity (45 pp.) by Gorter is principally a short account of electric conduction in solids, liquids, and gases. Several topics in solid-state physics (dielectric polarization, semiconductors, and magnetic properties of solids) are discussed but all too briefly. Less than two pages is devoted to semiconductors.

The last four sections are appropriately placed at the end of the book in order to avoid disturbing the continuity of the major portion. Section nine on thermodynamics (74 pp.) by de Boer covers much of the standard material given in an introductory course in the subject. Section ten on electric instruments (35 pp.) by Gorter and section eleven on optical instruments (68 pp.) by Van Heel are particularly valuable as reference material. The final section on medical physics (41 pp.), by Burger is something really new in a textbook of this sort and is therefore particularly welcome, especially to students in biology or biophysics.

As a textbook this volume is impressive in many respects. The subjects are treated so rigorously and coherently that a student will not have to unlearn any material if he continues his studies in physics. It is beautifully printed. Typographic errors are practically nonexistent. The rationalized mks system is used exclusively throughout the book. The principal weakness from a teacher's point of view is the complete absence of problems and the almost complete absence of illustrative numerical examples.

Textbook of Physics has many excellent features that make it an outstanding reference work as well as a textbook. In particular, one might mention the numerous more advanced topics printed in small type, the many subjects of specialized interest marked by asterisks, the lists of books recommended for further study (at the end of each section), and the biographical material. It would indeed be a valuable addition to the bookshelf of any serious student of science.

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Modern Aspects of Electrochemistry. J. O'M. Bockris, Ed. With the assistance of B. E. Conway. "Modern Aspects Series of Chemistry," No. 1. F. C. Tompkins, Ed. Academic Press, New York; Butterworths, London, 1954. x + 344 pp. Illus. $6.80.

This is the first of a series of books to be published on the modern aspects of chemistry, and it deals with five topics in the field of electrochemistry. It is hoped that this book will not be the sole one in electrochemistry. Although the topics, discussed by experts in the fields, are well done and timely, they cover a restricted area in electrochemistry.

The editors have compiled an interesting reference book, which should prove valuable to the specialist and to those with fundamental backgrounds but not actively engaged in electrochemistry. The topics, are presented somewhat in the nature of reviews in five chapters: "Physical chemistry of synthetic polyelectrolytes," H. Eisenberg and R. M. Fuoss; "Ionic solvation," B. E. Conway and J. O'M. Bockris; "Equilibrium properties of electrified interphases," R. Parsons; "Electrode kinetics," J. O'M. Bockris; and "Electrochemical properties of nerve and muscle," W. F. Floyd.

Eisenberg and Fuoss give a good discourse for the expert on the modern advances made in the physical chemistry of synthetic polyelectrolytes. Although it contains much that is electrochemistry, it includes discussions, undoubtedly essential, on the structure of polyelectrolytes as found from colligative, surface, and hydrodynamic properties, and in this sense deviates from Bockris' definition of electrochemistry as given in his preface.

Conway and Bockris emphasize once again the difficulties encountered in obtaining unequivocal values for the degree of solvation of ions and discuss at