

GENERAL PRINCIPLES OF PHYSICAL SCIENCE : AN INTRODUCTION TO THE STUDY OF THE GENERAL PRINCIPLES OF CHEMISTRY. BY ARTHUR A. NOYES. New York : Henry Holt & Co. 1902. viii + 172 pp.

While works on physical chemistry are rapidly multiplying, it is refreshing to encounter one which promises to be a distinct creation rather than a mere variation or even an improvement on its predecessors. As the present volume treats of certain parts of the subject only, an outline of its contents must be given. The first chapter, a brief one, deals mainly with the method of science. The second, also brief, discusses the fundamental concepts of physical science. The third chapter, occupying over 50 pages, treats of the general principles relating to matter. The fourth chapter, about 100 pages in length, is devoted to the general principles relating to energy. It is to be regretted that the preface does not offer any hope of the early appearance of the remaining sections dealing with the general theories of chemistry, the relations between physical properties and chemical composition, the principles relating to the occurrence and equilibrium of chemical changes, and the principles relating to the energy changes attending chemical changes.

Although the book does not deal with the whole subject of physical chemistry, it is complete in itself. While the value of the book lies largely in the sanity and symmetry of the whole treatment, a few specially excellent features may be mentioned. The unscientific patchwork of unharmonized definitions which does duty in most books on chemistry has at last been "scrapped," and it was high time that some one should undertake this task, and an inter-consistent set of definitions of the laws and terms of the science has been devised to take its place. Much care has been used in explaining the nature and relations of the various units employed in physical science. The conception of the intensity and capacity factors of the several forms of energy occupies the fundamental position in the treatment of energetics which it deserves, but has not yet received in most books in the English language. In the discussion of the laws of energetics (formerly thermodynamics), the author is remarkably successful in anticipating and avoiding or disposing of the stumbling blocks which most students of the subject encounter.

The whole treatment is scholarly in its methods and philosophical in its grasp, and at the same time it is extraordinarily

lucid. Nothing that can set each conception in the clearest light and in the most instructive relation to other conceptions seems to be forgotten. No one interested in the teaching or study of general or physical chemistry can afford to leave this book unread.

ALEXANDER SMITH.

GALVANIC BATTERIES: THEIR THEORY, CONSTRUCTION, AND USE. BY S. R. BOTTONE. London and New York: Whittaker and Co. 1902. xvi + 376 pp. Price, \$1.50.

The author states in his preface that this work contains a description of every known battery of any practical use along with data as to electromotive force, internal resistance, and adaptability to particular requirements. For those who may have occasion to use batteries instead of a dynamo as a source of current, the book will undoubtedly prove helpful. Although the author states that "In order to render the book useful from a scientific point of view, as well as under the practical aspect, the theory of the battery has been carefully gone into," no mention is made of theories advanced by Helmholtz and by Nernst, which have thrown such a flood of light upon the whole subject. The book is profusely illustrated and the descriptions of the construction and operation of the batteries clear and concise.

C. E. LINEBARGER.

LABORATORY EXERCISES IN PHYSICS FOR SECONDARY SCHOOLS. BY GEORGE R. TWISS, B.Sc., Head of the Department of Science in the Central High School, Cleveland, Ohio. New York: The Macmillan Co. 1902. xiii + 193 pp. Price, 80 cents.

This manual is characterized by thoroughness of treatment and carefulness of statement. The author believes that "A small number of exercises worked for all there is in them" is better than a large number carelessly and superficially performed. The author has succeeded well in this his attempt "*first*, to secure the thorough enforcement of some of the fundamental principles of the science, together with a view of the kind of thinking and experimentation by means of which the facts and principles of physics have been established; *second*, to develop habits of precision in observation, thought and expression; and *third*, to train the student in the acquisition of practical power and skill in the use of apparatus."

C. E. LINEBARGER.