

woven together so as to present a miniature picture of chemical theory as it is. One feels on first noting the small size of the volume and the extent of the ground it attempts to cover, that the treatment will of necessity be hackneyed, congested, and charmlessly bare. One is therefor all the more delighted to find that on the contrary, such is the art with which the matter is put together, the mode of handling is fresh, lucid, and attractive, and that the book is, in fact, genuinely readable.

In the systematic part of the volume the limits of space have been met by ingenious classification of the subject. Instead of treating one element at a time in the stereotyped way, the subdivisions are more general. Thus all the methods of isolating elements are discussed together, and a summary of the properties of all the elements follows. Then the common classes of compounds, such as hydrides, halides, oxides, and so forth, are taken up in succession and the various modes of forming the members of each class are described and illustrated. Indicators, the solubility product, alloys, and even the salts of complex inorganic amines receive attention. As in the theoretical portion, the author has managed to include the interesting as well as the fundamental things.

The specialist in other sciences will find in the volume a vivid picture of the outlines of modern chemistry, and the chemist will not fail to derive equal refreshment and profit from its perusal.

ALEXANDER SMITH.

PHYSIKALISCH-CHEMISCHE ÜBUNGEN. DR. W. A. ROTH. a. o. Prof. in Greifswald. Leopold Voss, Hamburg and Leipzig 1907. XII+174 pp. Cloth, price 5 Marks.

This book, as its title indicates, and the author is careful to further emphasize in his preface, makes no claim to compete as a reference book with the larger manuals on the subject such as the Ostwald-Luther "Hand-und Hilfsbuch," but endeavors to present in concise and easily intelligible form, fairly specific directions for a set of laboratory exercises together with such discussion of the general principles involved as to bring out the full pedagogic value of the practical work itself. In pursuance of this idea the author has omitted practically all references to the original literature and has compiled the accompanying tables to meet simply the immediate needs of the text. The book we are told represents, essentially the work of the elementary course ("Kleinen Praktikums") in physical chemistry conducted by Prof. Nernst in Göttingen and later in Berlin.

The chief headings in their order are: Introduction, the fundamentals of physical measurements and calculations, 12 pages. Determination of density of gases, liquids and solids, 23 pages. Molecular weight of dissolved substances, 15 pages. Thermochemistry, 18 pages. Determination of optical constants, 13 pages. Chemical statics and kinetics, 9 pages. The remaining third of the book is devoted to Electrochemistry,

subdivided as follows: Fundamental principles, 18 pages. Conductivity, 13 pages. Faraday's law and migration numbers, 9 pages. Electromotive force, 15 pages. Electro-static measurements, including radio-activity, 9 pages. Tables, 3 pages.

The selection and proportioning throughout is good and the book contains much in its choice of experiments and mode of carrying them out that should prove helpful to those in charge of such courses.

Anyone who has attempted to break away from the meager assortment of stock experiments used as illustrations over and over again by the different authors of physico-chemical text books knows the difficulty of finding suitable substitutes which can really be used effectively under the limitations of time and equipment which usually obtain in an elementary laboratory course. It is perhaps in this matter that the present book will be of most service to teachers in this country.

On the whole the book presents an admirable treatment of the subject for the purpose the author had before him.

F. G. COTTRELL.

THEORIES OF CHEMISTRY, BEING LECTURES DELIVERED AT THE UNIVERSITY OF CALIFORNIA, IN BERKELEY. BY SVANTE ARRHENIUS. Edited by T. Slater. Price, \$1.75. Longmans, Green & Co., 1907.

The appearance of these lectures by Arrhenius, and the previous appearance of a similar set by Ostwald, has made the past year one singularly rich in the historical and philosophical treatment of general and physical chemistry. Coming as they do from such master hands, treating similar problems, and each full to overflowing with the genius of their authors, they can not fail to supplement one another, and to exert enormous influence for good.

The lectures of Arrhenius are not only more special than those of Ostwald in the material treated, but also differ in the general point of view. The two sets, in fact, represent ideals of opposite extremes in methods of thought and treatment. Ostwald with his love of historical research, seeking out the originator of each fruitful thought, and placing each concept on a hypothesis-free foundation; Arrhenius developing and basing his ideas upon the conventional hypotheses which are, and have been, in common use. Both will be read widely because of the authority and pre-eminent station of their authors, but probably at the present day the method of Arrhenius will be the more popular, because more conservative and less startling. It is not likely to be so in the future, however; then, and in the opinion of the reviewer this day cannot be far distant, the method used by Ostwald will be accepted as the simpler and clearer.

In few words, Ostwald shows how the things which have been developed *could* be developed without the aid of hypotheses; Arrhenius, on the other hand, shows how these things *have been* developed, and how