

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

logical has been the growth of our modern theories from the older ones.

This book cannot be too highly recommended to those interested in physical chemistry. The sane view of each question considered, the excellent exposition of each theory, and the clear, close reasoning with which the fallacy of often misunderstood points is exposed, together with the excellent English, make the book one that it is a pleasure to read. The chapter headings are as follows: Introduction—The use of theories; Old hypotheses in chemistry; Existence of hydrates in solution; Discussion of the validity of Dalton's law; Electrical force between the atoms; The law of Faraday; Chemical valency and affinity; The development of the doctrine of valency; Composition of the atoms.—Electrons; Theory of gases; Chemical kinetics and statics; The influence of temperature and pressure—Dissociation; Osmotic pressure—General laws for dissolved substances; Electrolytic dissociation; Problems to be solved—Objections.

J. LIVINGSTON R. MORGAN.

WELLCOME'S PHOTOGRAPHIC EXPOSURE RECORD. BY BURROUGHS, WELLCOME & Co., 45 Lafayette Street, New York City. Price, 50 cents.

A large amount of useful information for photographers, more especially in regard to exposing and developing, together with a diary; all this made up in an elegant little volume of practical dimensions to be carried in the pocket.

L. H. BAEKELAND.

HYDROMETALLURGY OF SILVER—WITH SPECIAL REFERENCE TO CHLORODIZING, ROASTING AND THE EXTRACTION OF SILVER BY HYPOSULPHITE AND CYANIDÉ SOLUTIONS. BY OTTOKAR HOFMANN. pp. V+345. 83 illustrations. Hill Publishing Co., New York, London: 1907. Cloth, \$4.00.

The author of this book introduced the Patera Process of leaching silver ores with hyposulphite solutions in 1868 in Mexico. Since that time he has been prominent in this branch of metallurgy and has won for himself the enviable position of an acknowledged authority.

The book under consideration is on the whole a record of personal experience based upon established principles. There is presented not a general treatise like that of H. F. Collins,¹ in which all that leading workers have accomplished is brought together in a most satisfactory manner, but a book resembling more the well known volume of the late C. A. Stetefeldt.² While Hofmann aims to bring out mainly the full details of practice and is antagonistic to the Russell modification of the Patera process, Stetefeldt lays more stress upon chemical conceptions and is the acknowledged defender of the late E. H. Russell. The three publications supplement one another and about cover the field.

In addition to the Patera process which, with chlorodizing roasting, takes up 255 of the 328 pages of text, the Augustin and Ziervogel pro-

¹ "Silver," Griffin & Co., London, 1900.

² The Lixiviation of Silver Ores with Hyposulphite Solutions, author, New York,