quire much attention, extend over a long period, and are often failures owing to conditions that require experience to foresee and control. Some of the experiments require technical knowledge and skill not to be expected of the average pupil who presents himself for this class of work, as, for example, where the directions say to determine the nitrogen by Kjeldahl's method or by Stutzer's method, and with a reference to a chemical treatise proceeds to the next step in the experiment as if the quantitative determination of nitrogen were an everyday affair in a botanical laboratory.

But these defects, or limitations, may be dismissed as not impairing the usefulness of the work, if it be understood at the outset that the book is not adapted to seriatim study by the classes of any institution, unless it be those of the author, at least not those in any American institution. But a sufficient wealth of material is provided so that the instructor may select what best suits his purpose, and under this eclectic system the work must commend itself as highly satisfactory and serviceable.

J. C. Arthur.

Quantitative Chemical Analysis by Electrolysis. By Dr. Alexander Classen, Privy-Councillor, Professor of electro-chemistry and inorganic chemistry in the Royal School of Technology at Aachen; in cooperation with Dr. Walter Löb, lecturer on electro-chemistry in the Royal School of Technology at Aachen. Authorized translation, third English from the revised and greatly enlarged fourth German edition, by William Hale Herrick, A.M., formerly professor of chemistry in Iowa College and in the Pennsylvania State College, and Bertram B. Boltwood, Ph.D., instructor in analytical chemistry in the Sheffield Scientific School of Yale University. New York, John Wiley & Sons; London, Chapman & Hall. 1898. Pp. 301.

The earlier editions of Classen's book are so well known that it is only necessary to call attention to the difference between this and preceding editions. The book is greatly improved by the introductory chapter on the theory of electro-chemistry. Says the author in his preface: "The present edition, revised with the assistance of Dr. Löb, differs from the previous editions in that the introduction has been augmented by the insertion of a section devoted to theory. This was made the more necessary since the investigations of recent years have been chiefly devoted to the explanation of reactions in solutions and the determination of electrical magnitudes." This chapter deals with the theory of electrolytic dissociation, the laws of Faraday and Ohm, the significance of tension, current strength, and resistance, the theory of electrolytic precipitation.

The remainder of the 'general part' of the book takes up the methods of measuring the strength of the current, the measurement of current tension, the sources of current, including primary and secondary batteries, and physical means of producing the current, such as electro-magnetic machines and thermopiles. Given the means of producing, regulating and measuring the current, it remains to apply the methods to the precipitation and separation of the metals. These are described in the 'special part' of the book, and it is safe to say that most of the best electro-chemical methods are included here. The appendix contains a number of practical examples of electro-chemical analysis.

This book comes from one of the leading authorities, and is generally recognized as a standard in the field which it covers.

H. C. J.

Introduction to Electro-chemical Experiments. By Dr. Felix Oettel. Translated by Edgar F. Smith. Philadelphia, P. Blakiston, Son & Co. 1897. Pp. 143.

Practical Exercises in Electro-chemistry. By Dr. Felix Oettel. Translated by Edgar F. Smith. Philadelphia, P. Blakiston, Son & Co. 1897. Pp. 92.

The first of these two little books by Oettel deals with the conditions necessary for electro-chemical experiments, such as sources of the current, methods of measuring the current, including different forms of the voltameter and galvanometer, and methods of measuring pressure. The arrangement of apparatus and electrolyte in carrying out an experiment is then taken up. This is followed by a brief discus-