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-

sion of polarization currents, Faraday's law, ion transference, preliminary experiments, etc.; and the concluding chapter discusses the construction and calibration of instruments, such as the tangent galvanometer and those used for measuring pressure and regulating resistance. Tables of electro-chemical equivalents of the more important elements, of thermochemical data, and of wire resistance, are appended.

The second book, as its title implies, is in part of a more practical character. The first forty pages are given again to a discussion of instruments, but the remainder is devoted to a discussion of simple electro-chemical experiments, such as electrolysis of hydrochloric acid with and without a diaphragm; electrolysis of dilute sulphuric acid, or sodium hydroxide, with a diaphragm; formation of persulphuric acid by the electrolysis of sulphuric acid; precipitation of copper under different conditions; precipitation of magnesium from a fused salt of the metal; the number of processes involved being sufficient to give some idea of electrochemical operations.

The final chapter, on 'Organic Electrolysis,' was written by Professor Elbs and is one of the most interesting chapters in the book. In a very few experiments it gives some idea of the application of electrolysis to organic chemistry, an idea which is, however, greatly enlarged by such a work as the third volume of Peters' 'Angewandte Elektrochemie.'

The translation by Professor Smith is especially welcome, not simply because of his skill in such work, but since it comes from the leading authority in practical electro-chemistry in America.

H. C. J.

SCIENTIFIC JOURNALS.

The Journal of Geology, May–June, 1898: The number opens with 'A Symposium on the Classification and Nomenclature of Geologic Time-Divisions,' a contribution that is based on a series of fourteen questions that had been submitted to the geologists mentioned below. The questions involve a discussion of the extent to which subdivision should be pursued in the time and physical scales, and of the number of geological periods (as the word period was used by the Berlin Congress) which it is desirable to adopt. Considerable difference of opinion is developed, so much so as to make the average teacher impatient with this continual tinkering with words. Opinions are expressed by Joseph Le Conte, G. K. Gilbert, W. B. Clarke, S. W. Williston, Bailey Willis, C. R. Keyes and Samuel Calvin. 'Probable Stratigraphical Equivalents of the Coal Measures of Arkansas,' by C. R. Keyes. The author cites the great thickness of the Arkansas Coal Measures as compared with those of Iowa and Missouri, *i. e.*, 2,400 feet as against 500–600, and strongly opposes the ordinary conception of the Ozark island of Carboniferous and later time. He emphasizes the evidence that land conditions followed the deposition of the St. Louis limestone and preceded the formation of the Iowa and Missouri Coal Measures. He explains the greater thickness of the Arkansas measures by their continuity of deposition without regard to this change on the north. A paper 'On the Origin of certain Siliceous Rocks' is presented in two parts. The first, by O. A. Derby, contains 'Notes on Arkansas Novaculite,' and gives the results of an investigation of the novaculite by crushing it to slimes without destroying the larger included grains of secondary quartz. The slimes were then studied with the microscope, and the author reached the conclusion that an origin by replacement of cherty limestone has great claims to confidence. J. C. Branner, in the second part, comments on these results and systematically reviews the explanations that have beeen advanced for the siliceous rocks. He adds a few notes on those in California. 'A Study of Some Examples of Rock Variation,' by J. M. Clements, deals with an interesting series of eruptives at Crystal Falls, Mich., which follow the Upper Huronian and precede the Potsdam. The series consists of quartz-diorite, hornblende-gabbro, bronzite-norite and peridotite, and is described in detail with analyses. The hornblende-gabbro was first in time; then came the norite and peridotite, and, last of all, the diorite with transitions into granite. Under the 'Studies for Students' a good brief review of the development and geological relations of the fishes is given by E.