In the second chapter the general principle of precipitation from aqueous solutions as determined by the solubility product and the composition of the ions is discussed, and this in connection with well-chosen illustrations.

Chapter III is devoted to the hydrogen and hydroxyl ions and includes the theory of indicators.

Chapter IV deals with the results of electrolysis of various aqueous solutions as viewed in the light of the dissociation theory. It also includes a treatment of the color produced by ions in solution and general statements as to the dissociation of the different classes of compounds.

The work is a concise and readable treatment of the subject. The choice of method and the experimental illustration are both as well chosen as would be consistent with so brief an introduction to the theory. W. R. WHITNEY.

PRACTICAL METHODS OF ELECTRO-CHEMISTRY. By F. MOLLWO PERKIN, PH.D., Head of the Chemistry Department, Borough Polytechnic Institute, London. New York: Longmans, Green & Co. 1905.

The present volume does not pretend to give a complete course in practical electro-chemistry. It gives examples in the determination of metals and also in their separation. It also gives a very good list of examples in inorganic and organic electro-chemistry. To have made it representative there should have been added experiments with the electric furnace.

The introduction of the book contains a number of very interesting points for the beginner in electro-chemistry. They have been set forth very clearly and certainly will prove helpful to those who are about to take their first step in this growing department of chemistry. It is right and proper that the author should emphasize the important points in the work of Michael Faraday. Those who are acquainted with the subject well know that he truly deserves the title of "Father of Electro-chemistry;" but, in these days there is a tendency—not intentional be it said—to ignore much of the work that we owe to that great master.

The writer's experience would lead him to differ as to the value of some of the methods suggested for the determination of the few metals which are given, and also, to some of the separations. For example, the author of the book seems to think that the old gravimetric method for the separation of silver from copper is preferable to any electrolytic procedure. This certainly is not correct,

for any one who has interested himself in the separation of these two metals in a cyanide solution well knows that the current separates them most completely and in the most satisfactory form; that little is left to the analyst himself and the results are reliable and accurate.

A curious mistake is made by the author in the section entitled "Metals Deposited as Oxides at the Anode," where one reads, for example, that uranium is deposited as the hydrated oxide U_3O_4, page 141, and molybdenum as hydrated sesquioxide, page 142, *on the anode*. Perhaps this is a slip on the part of the author; but it is one to which his attention should be called. The hydrated oxides, just referred to, are deposited quantitatively *upon the cathode*. There are, also, several names of chemists improperly or incorrectly spelled (Muir for Muhr page 127, and Korn for Kern page 141, etc.,); but this will be corrected, no doubt, in a subsequent edition.

One would think that in a book which has appeared so recently some mention would be made of the latest developments in electro-analysis. It is true that in speaking of the forms of apparatus used in work of this kind brief mention is made of a suitable rotating cathode, and that Gooch and Medway used a platinum crucible for this purpose; but the strangeness is that the student is not told how easily most of the metals are determined to-day by rotating the anode. When it is possible to make a determination of copper, precipitating as much as 0.5 gram in weighable form in from five to ten minutes—a thing that is being done daily —it would seem that some directions might be given the student to do this; and that when it is possible to analyze completely a nickel coin, or even determine the zinc in sphalerite in a period of time not exceeding two hours, that those who are expected to do work in practical electro-chemistry should have received a hint as to how these rapid determinations may be carried out. It is not necessary to refer to the absence of any allusion to the use of a mercury cathode; yet, as these new things have been so rapidly and beautifully confirmed by experiment they deserve a passing notice.

The section devoted to the preparation of inorganic and organic compounds is superior to that devoted to the analytical processes, and students will carry out the experiments there described with a great deal of satisfaction.

The volume aims apparently to bring together in a concise form the striking features of books like Oettel's "Electrochemical Experiments," Oettel's "Exercises in Practical Electro-chemistry," Elbs' "Electrolytic Preparations," and those of the various books on electro-analysis. The author states in his preface that he had in view the making of a book which should stimulate experimentation in the great field of electro-chemistry. His effort will be helpful, and deserves a place among the many other books which have been written at various times and in different lands for the same purpose. As a student of electro-chemistry the writer feels himself indebted to Dr. Perkin for this contribution.

EDGAR F. SMITH.

LEÇONS SUR LA THÉORIE DES GAZ. PAR LUDWIG BOLTZMANN. Traduites PAR A. GALLOTTI ET H. BÉNARD. Seconde Partie. Paris: Gauthier-Villars. 1905.

The author notes that since the publications of the first part of the present work many objections against the kinetic theory of gases have appeared, but he is convinced that the objections rest solely on misunderstandings, and that the theory is to render further services to science. He gives many pages to the wealth of deductions from the theory which were obtained by van der Waals, and which have been found to agree with experience; and tells how Ramsay used the teachings of the theory in determining the atomic weight of argon and its place in the periodic system of the elements, and how after the discovery of neon good ground was afforded for accepting the number assigned to argon. He thinks it would be a disaster to science if any weight of authority arrayed against the kinetic theory should cause it to fall into temporary oblivion, as the authority of Newton caused the undulatory hypothesis to fall.

The topics considered in this second part are three: The theory of van der Waals, polyatomic gases and dissociation. The object here, as in the first part, is to examine, by rigorous mathematical methods, the consequences of certain hypotheses. Such a discussion, somewhat remote from chemistry and even from physical chemistry, leans so far towards mathematical physics that a journal of chemistry must mention it but briefly. It is the great work of the leading exponent of the kinetic theory on its mathematical side, and this clear translation into French will facilitate its study.

EDWARD W. MORLEY.