In A the titer for the whole 100 cc. was only 0.54 cc. of barium hydroxide, which was too small for the calculation of a curve. In B the titer was 2.35 cc. and in C, 5.61 cc., for which the following curves were calculated:

	10 cc.	20 cc.	30 cc.	40 cc.	50 cc.	60 cc.	70 cc.	80 cc.	90 cc.	100 cc.
B.....	1.7	4.2	6.8	11.0	16.1	23.8	32.3	45.1	65.1	100
C.....	2.3	4.9	8.3	13.0	18.5	25.8	35.4	48.4	58.6	100
D.....	5.9	12.2	19.0	26.4	34.4	43.2	52.8	64.6	79.6	100

It is evident that these figures for lactic acid are not comparable to those for formic acid; nor do they agree with those reported by Dox and Neidig. The highest titer we found for the 100 cc. of distillate showed only 3.0% of the total acid, while Dox and Neidig found 5.8%; which result can again be explained only by the presence of a small amount of carbon dioxide in their solution, or by a volatil impurity in their lactic acid.

The facts presented seem to warrant the following conclusions:

1. Lactic acid is but slightly volatil in steam at 100°. The amount that passes over in the distillation of volatil acids from silage is insignificant, being equivalent to not over three or four cc. 0.1 *N* alkali in four liters of distillate.

2. Lactic acid is not sufficiently volatil to enable one to calculate a Duclaux curve for it, as only about 3% passes over in the 100 cc.

3. It is suggested that the higher results of Dox and Neidig in their experiments on the volatility of lactic acid may be due to carbon dioxide in the water used, or to volatil impurities in the lactic acid.

NEW BOOKS.

Traité de Chimie Minérale. Par H. ERDMANN. Tome premier. (8vo., pp. 559.) Paris, 1913. (A. Hermann et Fils. 12 Fr.)

This is a translation by Professor A. Corvisy of the fifth edition of the well-known, excellent German work. It is a rather extensive treatise, dealing particularly with the facts and with the experimental aspects of the subject, so that it is a very useful aid to the lecturer or to the reader who wishes fuller details than are given in the ordinary text-books on the subject. Erdmann's persistence, apparently for pedagogical reasons, in retaining the atomic weights based upon hydrogen as unity, instead of those based upon oxygen as 16, will not be approved of by most chemists, but it is a matter of little importance in comparison with the generally excellent features of the work.

The first volume, now under consideration, includes an introduction of 92 pages dealing with general principles, the greater part of the space being devoted to a discussion of the metalloids (non-metals). This artificial classification has placed selenium and tellurium in separate volumes.

The illustrations are numerous and unusually good and two beautiful colored plates of gas-spectra are included.

The translation of this important work into French will be welcomed by those who prefer this language to the original German.

H. L. WELLS.

Handbuch der Arbeitsmethoden in der Chemie. Herausgegeben von ARTHUR STÄHLER. Erster Band. (8vo., pp. 786.) Leipzig, 1913. (Veit & Comp., 25 m.)

This is a very elaborate work dealing with chemical operations, and prepared by the collaboration of more than 50 specialists of various countries, among whom are included the Americans, W. A. Noyes, T. W. Richards and E. F. Smith. This first volume, "allgemeiner Teil," deals with the inorganic chemical laboratory and its equipment, and with mechanical operations. The planning of laboratory buildings is discussed, and a great many kinds of apparatus are described. The volume contains no less than 1064 illustrations. It appears that all working chemists will find this book useful, and that it should find a place in every chemical laboratory.

H. L. WELLS.

Handbuch der Mineralchemie. By DOELTER ET AL. Vol. III, 1. (Bogen 1–10.) Theodor Steinkopff. Dresden. Price, M. 6.50.

The third volume of Mineralchemie begins with a consideration of the minerals which contain the rarer elements of the fourth group of the periodic system, titanium, zirconium and germanium—first the oxides, then the salts into which they enter. The arrangement may be criticized in one or two details. Thorium naturally follows zirconium; whereas here germanium follows zirconium and thorium is left for future treatment. Again struverite and pseudobrookite are placed with the oxides, though they are probably titanates. The problem presented by the three forms of titanium oxide is perhaps the most interesting one in this part of the book. The old French master Hautefeuille succeeded in synthesizing all three—rutile, anatase and brookite—a long time ago, yet his work was not sufficiently vital to make clear the *fundamental* conditions of formation of the minerals and their consequent relations to each other and the rocks in which they occur. The formula for the comparatively common mineral ilmenite is the subject of an interesting discussion. Experiments show that it does not contain trivalent titanium for the sesquioxide dissolves in acids or alkalies with evolution of hydrogen while the mineral gives off no gas. In some varieties the iron is very largely ferrous and one would feel justified in pronouncing it a ferrous titanate, were it not that other specimens contain much ferric iron as well as other oxides. Another question of similar kind is the nature of zircon. The close approximation of the molecular percentages of silica and zirconia

in this mineral to the ratio 1 : 1 has led many mineralogists to regard it as a zirconium orthosilicate. On the other hand, the crystallographic constants are so close to those of silica and apparently also to zirconia that it may be an isomorphous mixture of the two oxides. To this view Doelter inclines, citing in support of it some recent evidence of his own to the effect that he obtained from synthetic mixtures of zirconia and silica in the rarios 1 : 2 and 2 : 3 crystals which had the *appearance* of zircon. This is interesting as fas as it goes but far too meagre to settle the case. Probably the most valuable matter to be found in this portion of the book is that on analytical methods. Methods for the separation of zirconium and germanium from one another and from other elements, especially the rare columbium, tantalum and uranium, are not often found in text-books, and their collation with numerous references constitutes a useful work. E. T. ALLEN.

An Introduction to Chemical Analysis. By ELBERT W. ROCKWOOD, M.D., Ph.D. 4th Revised Edition. 1913. Price, $1.50 net. P. Blakiston's Son & Co.

The scope of this book can be seen from its table of contents: Part I. Qualitative Analysis. Part II. Volumetric Analysis. Part III. Applied Analysis. Part IV. Miscellaneous Information.

The author has shown good judgment in the selection and arrangement of the subject matter of this book, which is intended to meet the varied needs of students of medicine, pharmacy and dentistry in the University of Iowa.

An important and pedagogical feature of this book is the questions which appear at appropriate places throughout the text. They prevent blind mechanical following of directions, which for quantitative analysis are concise and sufficiently detailed to lead to accurate results. It is surprising that in a book of so small a compass, the author should have been able to condense so much important matter pertaining to qualitative and volumetric analysis. A novel and commendable feature of a book of this character is the section dealing with the testing of reagents. Besides illustrating one of the many important applications of a knowledge of qualitative analysis, this section serves to impress upon the future analyst the necessity for testing the materials he employs.

The book is well planned, clearly and concisely written, well printed and neatly and attractively bound. L. J. CURTMAN.

Electrochemisches Praktikum. VON ERICH MÜLLER mit einem Begleitwort von Fritz Foerster. 221 pp. Dresden, Verlag von T. Steinkopff, 1913. Price, M. 8.00.

This students' laboratory manual of electrochemical experiments is the result of twelve years' experience of Professor Foerster and the author in the "Technischen Hochschulen" of Dresden, Braunschweig and Stuttgart.

The first chapter contains recommendations in regard to wiring and equipment of the laboratory. Then follow directions for sixty-nine experiments distributed as follows: Ohms law, six; Faraday's law, two; conductivity of electrolytes, four; electromotive force, thirteen; storage batteries, one; electroanalysis, six; electroplating, two; preparation of inorganic compounds, nineteen; preparation of organic compounds, ten; electrolysis of molten salts, three; electro furnace processes, three. There is considerable very helpful explanatory discussion of each experiment or group of experiments.

The most serious criticism of the book is the omission of experiments on the migration of the ions. The reviewer has found that this part of the subject has given his students more difficulty than any other part of electrochemistry. The introduction of a laboratory experiment using a slightly simplified form of Washburn's apparatus (THIS JOURNAL, **31**, 327 (1909)) has enabled his students to convince themselves that concentration changes are produced around the electrodes by the passage of the current, and has helped greatly in giving them a clear conception of the mechanism of electrolytic conduction, the meaning of the transference number and the phenomena of concentration polarization. One of the three electric arc furnace experiments could advantageously be replaced by an experiment with a resistance furnace. The reviewer has had successful experience with the small carborundum furnace described by Tucker and Lampen (THIS JOURNAL, **28**, 853) as a students' laboratory experiment.

Any teacher of electrochemistry will find this book very helpful and suggestive and an English translation would be an excellent book to place in the hands of students in American university laboratories.

GRINNELL JONES.