

If a separation by this means is not desired the two elements may be reduced by stannous chloride in dilute hydrochloric acid solution or by hydroxyl amine, as recommended by Dr. H. F. Kellar. (*J. Franklin Inst.*, July, 1894); also *This Journal*, 16, 785, (1894).

Lat Solutions and Slimes.—These materials are usually controlled by special working tests, of which Titus Ulke has given a complete account. (*Ulke, Mineral Industry*, 2, 276, (1893)).

Electrical Resistance.—Refineries make tests of transverse strength, etc., on Riehle machines, but the most important physical test on the metal is the determination of its electrical conductivity. Many years ago, copper wire was tested in 20 or 30 foot lengths, on ordinary Wheatstone Bridges. The modern technical method involves the use of short lengths of wire, which are measured on low-resistance instruments, specially designed so that all parts shall be at the same uniform temperature, and all resistances of lead wires, plugs, or contacts are allowed for or eliminated.

Not only should such instruments be compared with Government standards, but a carefully tested set of copper wires should be provided, so that the instrument may be checked from time to time and any alteration detected. After handling wire samples they should remain on the Bridge at least ten minutes before testing. A distance of a foot from the body of the observer, will frequently make a difference of 2° F., equivalent to 0.4 per cent. change in electrical resistance.

Notwithstanding the number of supposedly good bridges on the market, there is room for improvement, as instruments from the same maker sometimes show unexplained differences when checked on the same samples of copper wire, and there appears to be a slight change in resistance of soldered joints, which one maker stated, is due to a very slow crystallization of the metal in the solder.

The foregoing methods of testing and chemical analysis to which frequent references have been made, are those in most common use, which the writer has found to give the careful observer an accurate knowledge of copper, and its by-products.

NEW BOOKS.

INORGANIC QUALITATIVE CHEMICAL ANALYSIS FOR ADVANCED SCHOOLS AND COLLEGES BY WILLIAM STOWELL LEAVENWORTH, M. SC., Professor of Chemistry, Olivet College, 1906. The Chemical Publishing Co., Easton, Pa. London: Williams and Norgate. pp. VI + 153. Price, \$1.50.

This manual plainly reflects the experience of a painstaking teacher, and fulfils its purpose "to occupy an intermediate position between the elaborate treatise and the skeleton outline." The book opens with some introductory advice on the general operations of analysis. This is followed by a series of experiments with separate solutions of the salts of the metals which constitute each qualitative group, these experiments being illustrative of those variations in behavior and properties of the individual metals upon which their separation and detection depend. From the notes of these experiments the student is expected to devise a workable method of separation. In Part II the important reactions of

the various metals are stated, and the student is expected to confirm them; this is followed by descriptions of the recognized procedure for the separation of each group and of the metals which compose it. Part III treats the acid radicals on the same general plan. Acetates of silver, barium, calcium, etc., are used as reagents in preference to salts of inorganic acids. In Part IV a systematic procedure for dry reactions, and for the solution of materials for analysis is given in unusual detail, and the complete course of examination for the metals is again discussed. The Appendix gives the important reactions of many of the rare metals, an elaborate list of reagents, with a brief statement regarding the strength and preparation of each, tables of atomic weights and solubilities, and outline tables for the analytical procedures. These outline tables, as well as certain tables expressing in skeleton form the analysis of each group, which occur in the body of the work, are perforated so that they could easily be removed from the book. The author gives no hint of the reason for this in his prefatory statements.

The little volume contains a great deal of useful information in concise and clear form, and the book is worthy of the attention of teachers of qualitative analysis. Some who have large classes to deal with will doubtless wonder how the students as a whole can be persuaded to withstand the temptation to consult the numerous tables and full text of the latter part of the book, when constructing the schemes of analysis asked for in Part II, even though these teachers may recognize the fundamental excellence of the plan. Whether the plan is as novel as the author appears to assume it to be, may be questioned.

The subject matter is presented without any attempt to interpret the reactions from the standpoint of the ionic theory.

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ELEMENTARY PRACTICAL CHEMISTRY. PART II. ANALYTICAL CHEMISTRY, QUALITATIVE AND QUANTITATIVE. BY FRANK CLOWES, D. SC. LOND. Emeritus Professor of Chemistry in the University College, Nottingham, etc., etc., and J. BERNARD COLEMAN, A. R. C. SC., Head of the Chemical Department of the South-Western Polytechnic, Chelsea, etc., etc., Fifth edition, London: 1907. J. & A. Churchill. Philadelphia: P. Blakiston's Son & Co. pp. XV + 237. Price, \$1.00 net.

This little volume is an abridgment of the well-known works on qualitative and quantitative analysis by the same authors, and is adapted for introductory and comparatively elementary courses in colleges and technical schools. These works are so generally recognized as useful manuals, and, as in the case of the present work, so many editions have been called for, that extended description is unnecessary. This edition, the authors state, has been carefully revised, and some additions have been made to the volumetric portion, as well as a few gravimetric separations, and there is also appended a short section on Inorganic Prepa-