

The book contains many experiments contributed by such masters as Emil Fischer, Landolt, Volhard, Erdmann, and others. It thus becomes the product of many minds and gains in value.

The thanks of every teacher of experimental chemistry are due Professor Kühling for the admirable manner in which he has performed his duties as editor.

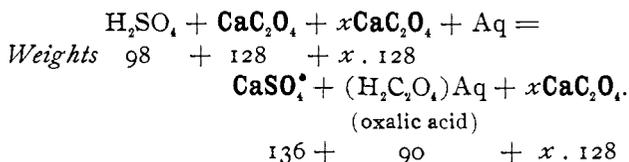
EDGAR F. SMITH.

THE ELEMENTS OF CHEMISTRY. BY M. M. PATTISON MUIR. Philadelphia: P. Blakiston's Son & Co., 1904. xiv + 554 pp. Price, \$3.50.

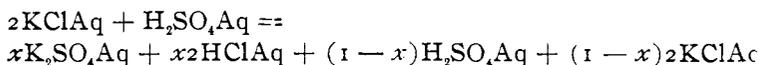
In this book certain features of an individual character attract attention. The order in which the subject is presented and the apportionment of space are as follows: The first five chapters (104 pages) are introductory and deal with homogeneous substances, the nature of chemical change, the laws of combination, atomic weights (by tacit assumption of Avogadro's hypothesis), equations, acids, basic and acidic oxides, salts, and chemical nomenclature. $H = 1$ is used as the basis of atomic weights. The two following chapters (40 pages) deal with oxygen and hydrogen, water and hydrogen peroxide. Chapter VIII (31 pages) covers nitrogen, nitric acid, the oxides of nitrogen, the dissociation of nitrogen peroxide, ammonia, hydrazoic acid, and hydrides in general. The subject is surely too difficult a one for this early stage. Chapter IX (52 pages) treats of sulphur, hydrogen sulphide, the oxides of sulphur, sulphuric acid and sulphates. Space is also found for the allotropy of sulphur and of oxygen, relation of acidic oxides to acids, the theory of ionization, normal and acid salts, acid radicals, the general relations of the basicity of acids and the composition of basic oxides to the composition of the salts derived from them, interactions of acids and salts in general, incomplete reactions between acids and salts in solution, theory of chemical equilibrium, the idea of equivalent weights of acids, the relative activity of acids and several methods of estimating it, the strength of bases, the interactions of salts with strong and weak acids, the ionic explanation of the strengths of acids and bases (7 pages), double decomposition, double salts, comparison of basic and acidic hydroxides, chlorides of sulphur, and, finally, dissociation and the calculation of its amount from vapor densities. There are about 6 pages occupied by groups of illustrative equations and tables of formulae. Chapters X to XIV (86 pages) over the metals of the alkalies, iron, manganese and chromium,

the arsenic family and the halogens. Chapter XV (14 pages) contains a classified list of oxidations and reductions. In Chapters XVI and XVII (66 pages) the atomic and molecular theories and the results of the application of Avogadro's hypothesis are handled. Chapter XVIII (38 pages) concerns isomerism and structural (including stereo-) formulae. The remaining eight chapters deal with the periodic law (20 pages), thermochemistry (8 pages), phosphorus (16 pages), carbon and silicon (11 pages), palladium and platinum (3 pages), argon, and conclusion (9 pages). In an appendix (14 pages) the properties of the elements are summarized. Interesting paragraphs of an historical nature occur at intervals.

Another characteristic of the book is observable in the formulae and equations. Gases, liquids and solids are distinguished by different type. In a large proportion of the equations the atomic and formula-weights are printed beneath the symbols; excess of one reagent, if required in the action, is indicated; and water is symbolized when the action takes place in solution. For example (page 210):



Reversible actions are indicated by the form:



the double arrow being seldom employed.

There is a tendency to lack of logical sequence and disregard of established pedagogical principles which might create difficulties for a beginner. For example, the relation of the magnetism of the earth to electrolysis (page 200) is not made clear; the only reference to sulphur-recovery appears in the paragraph dealing with the Solvay process (page 257); the illustrations of molecular structure (pages 415 to 442) are almost all selected from the chemistry of carbon and, coming as they do before this chapter has been reached, can have little meaning to the reader. Where an illustration of hydrolysis is wanted, the case of borax is cited (page

269), although sodium carbonate, having been handled in the preceding chapter, would have been a more natural choice; the electromotive series is discussed under potassium and sodium, although the illustrations necessarily deal with less electro-positive elements which have not yet been reached. Sometimes unimportant matters are dignified with distinct headings, while highly important things are concealed in paragraphs nominally on other subjects. Thus, the first summary of the chemical relations which distinguish the compounds of the metallic elements occurs in a paragraph on "Some Properties and Reactions of Iron."

As the list of contents shows, physico-chemical subjects occupy a conspicuous place in the book. This was what we should expect from a pioneer of physical chemistry in English. It is questionable, however, whether clear ideas will be obtained by beginners from such discussions as that of hydrolysis (page 209), and the neutralization of strong bases by weak acids (page 248).

There are not many slips in the book. Manganese dioxide and chromic acid are described as "basic peroxides" (page 110). Among the oxides which react with water to form the corresponding acids, but are not obtainable from those acids, P_2O_3 and Mn_2O_7 appear (page 193). On the same page, As_2O_3 is included among the oxides which, with water, do not give acids. Unfortunately for the elaborate illustration of the dissociation of SCl_4 (page 237), Ruff and Fischer have shown that SCl_2 does not exist. On page 247 the words hydroxide and hydrate should be transposed and on page 254 ($x-1$) should be $(1-x)$ throughout.

While this is an interesting attempt to present elementary chemistry from the modern standpoint, the peculiarities indicated above are likely to interfere with its wide adoption. A. S.

ANALYTICAL CHEMISTRY. VOL. II. QUANTITATIVE ANALYSIS. BY F. P. TREADWELL. Translated (with the author's permission) from the second German edition by WILLIAM T. HALL. New York: John Wiley and Sons, publishers. Price, \$4.50.

This book is a translation of the second German edition which appeared soon after the first, and which is already known to many English readers, though neither of the original editions has thus far received notice in this Journal.

Works on quantitative analysis are made up of art and science