such results. This is presented to the Section as an accessory in teaching which may prove instructive to the pupil and helpful to the teacher, and in a measure replace the use of the "rechentafeln" often so employed.

Upon coordinate paper, 500 by 400 mm., the abscissa 500 mm. is taken as 1000, and there is laid off upon the vertical ordinate, the length corresponding to the ratio for reduction of weight sought for weight found. A straight line is then drawn from the origin to this point. Thus we take for the copper in cupric oxide 798 or for chlorine in silver chloride 247.

A diagonal line is thus drawn from the origin for each such ratio to be employed. We then read off upon the horizontal abscissa the measure corresponding to the figures of the weight found and the length of the ordinate at that point, cut off by the diagonal line for that substance, gives directly the amount of the body sought.

F. P. DUNNINGTON.

NEW BOOKS.

PRINCIPLES OF INORGANIC CHEMISTRY. BY HARRY C. JONES. New York: The Macmillan Co. 1903. xx + 521 pp. Price, $4.00.

"The aim of this book is to add to the older generalizations those recently discovered, and to apply them to the phenomena of inorganic chemistry in such a way that they may form an integral part of the subject, and, at the same time, be intelligible to the student" (*Preface*).

The author states in the preface that the work is intended primarily for use by students of qualitative and quantitative analysis, and it may be presumed therefore that its aim is to modernize and expand the views of those who have already received some instruction in the elements of the science. At this stage, occasions for the application of modern ideas connected with ionization, mass action, solubility, and solution tension are certainly innumerable. Every operation in analysis, even the most trivial, bristles with opportunities for the use of these conceptions and can be performed intelligently and with unfailing success only by a student alive to the situation.

The book covers the general ground of a text-book of inorganic chemistry, but the theory of ionization and its application to the

explanation of chemical changes, including many of those used in analysis, receive special attention. Mass action, the phase rule, and Nernst's theory of solution tension, as well as radioactivity, colloidal solutions of metals, and other topics of contemporary interest are also discussed. Noteworthy features, besides the numerous ionic explanations of reactions, are the solubility curves of salts and the frequent tables showing the degree of ionization of various substances. The student whose training in general chemistry has lacked illumination by modern views, whether on account of the ignorance, conservatism, or deliberate preference of his first instructor, will find in this book abundant opportunity for bringing his conceptions up to date and getting in touch with the science as it is. To such a student the book will be most suggestive and stimulating. Dr. Jones is to be congratulated on having produced one of the best of the recent attempts to apply physico-chemical conceptions to undergraduate instruction.

The task essayed by the author is a difficult one, however, and the present volume is only a contribution towards the solution of the problem and not the solution itself. The treatment is one-sided. Ionic explanations abound, but chemical equilibrium which is fundamental to the understanding of ionic explanations in anything but a superficial way, and is of universal application outside of this restricted area, receives scant notice. The discussion of this subject is cut up awkwardly (*cf.* pp. 91 and 179), is inadequate to secure comprehension, and is not sufficiently illustrated either when first presented or later. In teaching, the first explanation of this subject has always to be a mere preliminary to that constant and various illustration and application which seem to constitute the only method of making it really clear. Without this—and every opportunity for this is strangely neglected by the author—that incorporation with the habits of thought of the student which alone can give him a command of modern chemistry has no chance of taking place. Surely a conception which, of all modern views, is by far the most fundamental to analysis, should have been driven home at every fair opportunity in a book intended for the student of analysis.

Even at the sacrifice of some of the elementary matter, space should have been found for the explanation in modern terms of such analytical methods and reactions as are usually omitted from text-books on general chemistry. Yet, so far as the reviewer can

discover, important topics like bead reactions, the solubility of magnesium hydroxide in ammonium chloride, the difference between double salts and salts of complex acids, the barium carbonate method, and the "solubility product" are not explained at all. The "normal solution" is defined (p. 112) as some physical chemists still unfortunately use the term (one mol per liter), and not as the analyst defines it. The behavior of the hydroxides of zinc (p. 389) and aluminum (p. 410) is ascribed to differing influences of acids and bases on the mode of ionization of the hydroxide, an assumption quite out of harmony with known facts. The precipitation of As_2S_5 (p. 259) in concentrated hydrochloric acid is attributed to the interaction of hydrogen sulphide and arsenic acid, although $AsCl_5$ is demonstrated to be the active substance by the result. Both of these cases might have furnished opportunities for beautiful applications of the theory of equilibrium. The paragraphs on indicators (p. 212) are misleading. The pink color of phenolphthaleïn in alkaline solution is not due to the ion of phenolphthaleïn itself, but to that of an isomeric colored acid.[1] Contrary to the statements in the book, this indicator is one of the best for weak acids, such as carbonic and phosphoric acids, provided they are not (like boric acid) weaker as acids than the isomer of phenolphthaleïn itself. The statement that this indicator cannot be used for titrating weak bases like ammonium hydroxide is correct, but the reason given is not. The cause of its lack of delicateness is the repression of the OH ions of the remaining hydroxide by the ammonium salts produced by the first stages of the titration.[2]

The book is worthy of a cordial reception, and it is to be hoped that a call for a second edition will speedily give opportunity for the needed modifications. ALEXANDER SMITH.

INORGANIC CHEMISTRY SYLLABUS. BY HUBERT C. CAREL, B.S., Assistant Professor in the University of Minnesota. Third Edition. Minneapolis: H. W. Wilson, Publisher. 1902. 182 pp.

This book has been prepared for the students of the Freshman classes of the medical department of the University of Minnesota, and is a condensed compendium of the salient facts of descriptive inorganic chemistry. A few pages here and there are given to theoretical chemistry. The book suffers somewhat from errors,

[1] This Journal, **24**, 588.
[2] *Am. Chem. J.*, **23**, 406.