NEW BOOKS

The Electrical Conductivity and Ionization Constants of Organic Compounds. *By Heyward Scudder. 17 × 24 cm; pp. v + 566. New York: D. Van Nostrand Co., 1914. Price: $3.00.*—The author has prepared "a bibliography of all the measurements of the ionization constants and the electrical conductivity of organic compounds that have appeared in the periodical literature between the years 1889 and 1910 inclusive, together with the values of the ionization constants, and certain values of the electrical conductivity."...

"In order to aid identification or to show the purity of a compound for which any numerical data are given, the melting-point or boiling-point is given in the tables when it is stated in an article. This melting-point or boiling-point refers to the sample measured, and not necessarily to the most highly purified sample described in the article. In some cases the melting-point or boiling-point of a derivative (as a salt) may be given, when the article does not furnish such data for the pure compound. The position of these identifying data is directly after the ionization constant, or after the measurement of the conductivity. In many cases, where the original supplies no such data, I have looked up the mode of preparation, in order to make sure what the compound is. There is a good deal of reasonable doubt as to the position of substituted groups in a number of compounds, for instance in the toluidine sulphonic acids.

"Immediately after the name are given (in parenthesis) the synonyms. These are inserted in some cases only for convenience in referring to the original articles, since the names used there have been abandoned. After the synonyms comes the empirical formula, and when convenient the extended formula. Cyclic formulae are given only in the grouping of the pages directly in front of the tables. The extended formulae are intended to be of assistance, but not to represent the definitive structure, nor to exclude the possibility of tautomeric forms, floating double bonds, etc.

"The bibliographical references for each compound are arranged under definite readings which are not specifically named in the text. These headings are: (1) the specific conductivity of the pure compounds; (2) the ionization constant; (3) the conductivity in aqueous solution; (4) the conductivity in solvents other than water; (5) miscellaneous measurements, as the conductivity of mixtures with other compounds, conductivity under varying pressure, etc.; (6) the conductivity of the salts....

"When there is an advantage in one article, either from its greater accuracy, or from its more extended measurements, that reference number is placed first. In other cases the reference numbers are given in numerical order, though of course the number of an article from which any data are taken is placed directly after such data, followed by the numbers of the other articles. If the ionization constants or conductivity measurements in two articles are widely different, both are usually given, placing first the more reliable, and stating any possible explanation of such difference. But if the data in one article are evidently inaccurate, they are not given, though the reference number of that article is given. When there may be some doubt from the name alone, what

compound is referred to, greater weight is usually given to articles containing some means of determining what compound was really measured, and how pure it was. In the case of isomers, when no identifying statements, such as melting-point, mode of preparation, etc., are made in an article, I have assumed that the most easily prepared or procured isomer was used."

The author has done his bibliographic work in a masterly manner. The book appeals to a limited circle; but it should prove of great value to those specializing in this particular line. If it were not for the high cost of publication and the limited sale, we could turn out as good monographs and bibliographies in this country as are published abroad. *Wilder D. Bancroft*

Alloys and their Industrial Applications. *By Edward F. Law. Second Edition. 22 × 14 cm; pp. vii + 332. London: Charles Griffin and Company, Limited, 1914.*—The subject is treated under the following headings: introduction; properties of alloys; methods of investigation; constitution; influence of temperature on properties; corrosion of alloys; bronzes; brass; special bronzes and brasses; German silver and miscellaneous copper alloys; white metal alloys; lead, tin, and antimony; antifriction alloys; aluminum alloys; silver and gold alloys; iron alloys; miscellaneous alloys.

In some respects the book is very good. Special stress is laid, pp. 112, 114, 227, on the effect due to the form in which a second phase appears, whether laminar or globular. The discussion of antifriction alloys is good and the remarks on the proper temperature for casting such alloys, p. 245, are also interesting. The attitude in regard to corrosion, p. 130, is also good.

"In some cases the process of corrosion stops itself automatically by the production of compounds which hinder further corrosion. Cases of this description are not uncommon, and an example of the greatest importance occurs in the employment of lead pipes for carrying water. It is well known that lead is appreciably soluble in water, and to such an extent as to render the water unfit for drinking purposes. Moreover, nearly all waters contain considerable quantities of sulphuric acid in the form of sulphates, which also have a corroding action on lead; but the product of the corrosion in this case is a practically insoluble compound, lead sulphate, which forms a coating on the surface of the metal and effectually prevents further corrosion, either by sulphates or by the water itself.

"Similar incorrodible coatings are formed on certain alloys, and an interesting example may be cited to illustrate this and also another protective influence exerted by one metal upon another. This is found in the case of an alloy of gold and silver containing 50 percent of each metal, which is practically insoluble in the ordinary acids. In hydrochloric acid or aqua regia a coating of silver chloride is immediately formed, and all action ceases. In nitric acid the silver on the surface is dissolved, and the alloy is then protected by a coating of gold which prevents further action taking place. This fact is well known to all assayers and refiners, and in the operation of 'parting' bullion (*i. e.*, dissolving out the silver with acid) it is necessary that the amount of silver should be considerably in excess of the gold, or the parting is incomplete. Certain copper alloys behave in a similar manner, the alloying metal being dissolved out until a surface deposit remains, which is only slightly acted upon by the corroding liquid. These facts are of the greatest importance and should always be borne in mind when consider-

ing the results of experimental tests, as they will frequently explain the startling differences between the results of actual practice and those obtained in experimental tests. Nearly all the results of experimental tests have been obtained by simple immersion of the alloy in water, dilute acid, or other corroding liquid; but in actual practice corrosion is usually accompanied by erosion to a greater or lesser extent, and the effect of this erosion in removing protective coatings and exposing fresh surfaces to the action of corrosion can readily be imagined, although it is often overlooked."

The book would be better if there were any evidence that the author had read any articles or books other than those published in England. While the reviewer does not believe that Tammann's method of thermal analysis will do all that is claimed for it, a reference to it should certainly be made in a book of this character. *Wilder D. Bancroft*

Physikalische Chemie der Zelle und der Gewebe. *By Rudolf Höber. Fourth Edition. 24 × 18 cm; pp. vii + 808. Leipzig: Wilhelm Engelmann, 1914. Price: 20 marks.*—The third edition was reviewed (**15,** 881) in 1911. This new edition is nearly one-fifth larger and the arrangement has been changed considerably, the chapter on colloids now preceding those on cell permeability and on the theory of narcosis. The book is still a remarkably good one; but one cannot go on indefinitely increasing the size of a book without changing its character. The difference between this edition and the previous one is an increase in the number of facts. By the time the fifth edition is called for, the author will have to make the book chiefly a compendium of data, or he will have to develop the theoretical side much more strongly, so that the experimental data can be presented briefly as illustrations of the general theory. It is to be hoped that the latter plan will be the one adopted by the author.

A great deal of work must be done before this is possible. The admirable chapter on the permeability of cells shows how far we still are from a satisfactory theory of this phenomenon. The reviewer feels confident, however, that part of this difficulty is due to attempts to carry through in its entirety some one theory in the form originally proposed. It is probable that there is something sound in nearly every one of the explanations offered and that the final theory will be a composite. We have been through much the same thing in colloid chemistry. When Müller published his book, in 1907, he distinguished solution theory, suspension theory, adsorption theory, distribution theory, theory of chemical complexes, and other theories. Under each head he had several subdivisions, all more or less mutually exclusive. The difficulty was that each man was interested especially in certain phenomena and worked out the particular form of the general theory which was best applicable to his particular problem and did not bother himself much about the other portions of the field. Thus, the electrical phenomena are the important ones with so-called colloidal suspensions in aqueous solutions and the theory of Hardy and Bredig took that into account without bothering itself very much in regard to adsorption, and without taking any account of the behavior of gelatine by itself or as a protective colloid. It is only by taking the good portions of each theory and combining them into one general theory that one can hope to reach a satisfactory result.

Höber classifies the views in regard to permeability of cells under the general

headings: plasma film as molecular sieve; plasma film as lipoid membrane; plasma film as albumin membrane. The view that we are dealing with a lipoid membrane is the one that has been worked out in most detail and which accounts for the most facts. On the other hand, it seems certain that this theory cannot account satisfactorily for all the facts and that it must be modified to some extent.

The reviewer was glad to see special stress laid, p. 170, upon the fact that Congo red is a colloid and that its use as an indicator is, therefore, affected by the presence of substances which may be adsorbed. Attention is also called by the author, p. 189, to Henderson's work on the importance of sodium phosphate in keeping the hydrogen concentration of the blood constant. On the other hand the reviewer is sorry to see so much stress laid on Schulze's law, which is only a first approximation. As such it is valuable, but it becomes positively harmful when promoted to the dignity of a law. The author also fails to appreciate fully that one is dealing throughout with selective adsorption, and that the order of the anions and cations is not necessarily the same with different substances.

Wilder D. Bancroft

Introduction to Physical Chemistry. *By James Walker. Seventh Edition. 15 × 22 cm; pp. xii + 420. New York: The Macmillan Company, 1913. Price, cloth, $2.60.*—The first edition of this book was reviewed in the Journal of Physical Chemistry (**4**, 41). The new edition is very similar to the last edition, not having been changed in form, but a number of minor changes have been made. More accurate values for constants, made possible by more accurate work, are given with some few minor changes. This book still holds the high standard which it deserves as a descriptive treatise of physical chemistry. The plan here, as before, is to select certain parts of the field and elaborate these, rather than to give a comprehensive view of the whole field. The book, however, is elementary in nature as before, and is still well suited as a basis for a lecture course in general and physical chemistry.

C. W. Bennett

Complex Ions in Aqueous Solutions. *By Arthur Jâques. 22 × 15 cm; pp. v + 151. New York: Longmans, Green and Co., 1914. Price: $1.35.*—The author gives a summary of our knowledge of complex ions and of the methods for determining the composition of a complex ion. The chapters are entitled: introductory; the chemical method; the ionic migration method; the distribution method; the solubility method; the electric potential method; some examples; ammoniacal salt solutions, etc.; some cobalt and copper solutions; some special cases of equilibrium; the hydrate theory. Such a compilation is likely to be distinctly serviceable. The author has overlooked or ignored the work of Parsons on the non-existence of KI_3 and he does not consider the possibility of colloidal solutions in the case of alkaline copper tartrate solutions for instance.

Wilder D. Bancroft