

accompany page 1260 and the footnote<sup>1</sup> added to "2" at bottom of page 1255.

Plot showing the relation between speed of corrosion of iron in water and the partial pressure of the oxygen in the carbon-dioxide-free atmosphere.

#### EXPERIMENTAL DATA.

No. 1.		No. 2.	
Percentage oxygen.	Grams iron dissolved.	Percentage oxygen.	Grams iron dissolved.
18.2	0.018	20.0	0.017
21.8	0.021	37.1	0.029
28.0	0.031	52.2	0.041
64.5	0.057	68.7	0.055
72.1	0.064	97.2	0.085
97.0	0.086	..	..

<sup>1</sup> Concerning the passivity imparted to iron by chromates, see A. S. Cushman, Bulletin No. 30, Office of Public Roads, U. S. Department of Agriculture.

#### NEW BOOKS.

**An Elementary Study of Chemistry.** By WILLIAM MCPHERSON AND WILLIAM EDWARDS HENDERSON. Revised edition. viii + 434 pp. Ginn & Company, Boston. (No date on title page.) Price, \$1.25.

This is an important book for it is manifestly destined to be widely used in high schools and small colleges and thus to have much influence upon education in chemistry. In the preface the authors say "they have made a consistent effort to make the text clear in outline, simple in style and language, conservatively modern in point of view and thoroughly teachable." It is a pleasure to be able to offer congratulations upon the good measure in which these aims have been attained.

The elementary facts of descriptive chemistry, chosen with admirable judgment, are presented clearly and interestingly. Even in the latter part, treating of the metals and their compounds, material apt to condense itself to a tedious catalogue of substances and properties, interest is well kept up by judicious interpolation of applications and short digressions. The simplicity and directness of the language and its hold on the attention remind one of Professor Remsen's texts.

The treatment of the theories is less praiseworthy. The atomic theory is stated on page 62, immediately following the law of multiple proportions. The reviewer believes this theory should be reached cautiously and laboriously through not only the laws of definite and multiple proportions by weights, but also Gay Lussac's law of combining volumes and Avogadro's molecular theory. These latter subjects are not considered until pages 194 and 226 respectively.

The authors do not insist enough upon the uncertainty inherent in all theories. On the contrary they repeatedly make the serious mistake of using theory as solid, rock-bottom fact upon which to build.

As one illustration of this we may cite the definition on page 116: "The valence of an element is that property which determines the number of the atoms of another element which its atom can hold in combination." If there is one place where theory has absolutely no business, where if present it does maximum harm, that place is in a definition. The dissociation theory also is brought in early (p. 99), on an inadequate experimental foundation, and is utilized as fundamental fact. Thus on page 107 we have the definition: "An acid is a substance which produces hydrogen ions when dissolved in water or other dissociating liquids."

Much time and thought must have been given to composing the numerous compact definitions, but even if they were not, many of them, open to the above criticism, it is doubtful if they are wholly desirable. Such brief statements are convenient from a teacher's point of view, furnishing knowledge in tablet form, which he has but to prescribe, two or three tablets daily five times a week, and go off about other business. Thus drugged the student makes a fine show when put through his paces by his trainer, but let an unfamiliar voice ask the questions in different form or, not satisfied with an accurate recital of the well committed phrase, press for further information, and great is the resultant distress, confusion or irritation as the case may be.

A book is not made modern by including the dissociation theory, the conception of chemical equilibrium, etc., alone. The real test is in the way theories are utilized. If they are taught didactically (by far the easiest way to teach them), the student is almost sure to attribute to them the finality of mathematical demonstrations, and the book is "conservative," *i. e.*, old-fashioned. If they are brought out as the best suggestions we have yet been able to make regarding branches of knowledge still in a state of flux, debatable and in no sense certain, the book is modern. The good old-fashioned book sends to the universities students much surer of many fundamental propositions than their teachers venture to feel, but with atrophied thinking faculties. The more difficultly teachable, modern book develops alert and critical but humble individuals with an almost painful appreciation of the limitations of human knowledge and a realization that the most far-reaching, most difficult, least understood problems of science lie at the beginning, in elementary chemistry. Judged by the above criteria the book under review is more "conservative" than "modern." It must be acknowledged that only a minority of teachers believe that it is better to give even immature high school students the undisguised truth, interlarded though it must be with many a "we don't know," and "we can only surmise;" and possibly this minority is mistaken. But it is also barely possible that the

high value set on "teachableness" is due, sometimes, as much to consideration for self as for students.

But the reviewer does not wish to be misunderstood, the good points of the book overbalance those which do not happen to coincide with his own, perhaps peculiar, notions, and the proof of his appreciation is that he intends to recommend it as one of the two or three best elementary texts known to him.

S. LAWRENCE BIGELOW.

**Die Kathodenstrahlen.** By G. C. SCHMIDT. Prof. Phys. Univ. Königsberg. Second edition. Braunschweig: F. Vieweg und Sohn. 1907. 127 pp. Price, Mark, 3.60, bound.

This monograph, which forms No. 2 of the collection, *Die Wissenschaft*, gives a clear and concise account of our knowledge of the electric discharge in evacuated vessels. The book is intended for the non-specialist; the use of mathematics is almost wholly avoided; yet, by means of well chosen illustrations and ingenious analogies, the reader is easily led to an accurate understanding of this most fascinating subject. The topics treated include the nature of light and the luminous ether; the cathode rays, their production and behavior, together with an excellent critical discussion of the various hypotheses regarding their nature; the nature of the electron or corpuscle, its velocity, charge and mass; the Zeeman effect; the canal rays, etc. This little book is a welcome addition to the semi-popular literature of the corpuscle, the primitive unit of which all matter seems to be built up. HERBERT N. MCCOY.

**The Microscopy of Technical Products.** From the German of Dr. T. F. Hanaušek. Translated by Andrew L. Winton, Ph D., with the collaboration of Kate G. Barber, Ph.D. New York: John Wiley & Sons. 1907. Svo, xii + 471 pages, 276 illustrations. Price, \$5.00.

This book which has enjoyed a well established reputation in the original is now presented to English readers in the work of Dr. Winton. While not dealing with chemical methods of identification, except incidentally, it nevertheless must possess no little interest for those chemists who are engaged in various lines of expert testing work in which recourse to the microscope is often absolutely necessary. The portion of the book which will be found the most useful to analytical chemists are the chapters on the starches, stems and roots and fruits and seeds. These are clearly written and illustrated.

The rapid extension of the national and state food and drug laws makes the kind of knowledge contained in this book especially valuable at the present time. The translator is at the head of the Government Food and Drug Laboratory in Chicago and has had a long experience in the line of work discussed in the book. From this practical experience he has been able to make more than a translation of it, as the numerous notes attest. The illustrations, essential in a work of this character,