

In an appendix of eight pages the translators criticise or give additional information upon a few topics in the book.

The work of translation appears to have been carefully done, and the English used by the translators is good. A short index is given, which might be made more comprehensive with great advantage. There are a great many short references to particular topics, and to the work of individuals, which can not be found by means of the index.

W. A. NOYES.

DESCRIPTIVE INORGANIC GENERAL CHEMISTRY. A TEXT-BOOK FOR COLLEGES. BY PAUL C. FREER, M.D., PH. D., (MUNICH), PROFESSOR OF GENERAL CHEMISTRY AND DIRECTOR OF THE LABORATORY OF GENERAL CHEMISTRY, UNIVERSITY OF MICHIGAN. Revised edition. pp. 550. 54 Illustrations. Boston: Allyn and Bacon. 1894. Introductory price \$3.00.

This book is intended as a text-book for colleges and is therefore adapted for the use of students who already have some knowledge of the elementary principles of the science. The treatment of the subject is consequently somewhat different from that usually pursued in the best of the recent text-books on chemistry. For example the book begins with a discussion of the atomic theory and the composition of chemical compounds. The author believes that "beginners should be taken through a course in which only a few elements and compounds are discussed, with the purpose of familiarizing the pupils with the fundamental laws which govern chemical change." "During the progress of such work as this," he continues, "I would not advise the use of chemical symbols or any reference to the atomic theory. It is manifestly impossible to make a student without experimental knowledge, understand, in all its bearings, a theory which it has taken some ninety years to place upon its present footing. If an elementary course, in which every stated fact has been proved by actual experiment, precedes the work given in this book, the pupil will be then amply fitted to look at chemical phenomena from the basis of the atomic theory."

Professor Freer is undoubtedly right in this matter and the sooner the teachers of chemistry in this country recognize the truth contained in the above-quoted statements and model their instruction on the plan there suggested the better it will be for the teaching of the science of chemistry in our colleges and uni-

versities. If the teaching of the elements of the subject could be relegated to the secondary schools, where it properly belongs, then it would be possible to give a very much more satisfactory course in chemistry in our colleges and universities on the lines laid down by Dr. Freer in the present book.

In the descriptive part of the work the author has used the last editions of Graham-Otto's "Lehrbuch der Allgemeinen Chemie," and Ladenburg's "Hardwörterbuch der Chemie," though the original articles in the chemical journals have been freely consulted. The elements have been discussed, in general, in the order in which they occur in the periodical system and the attempt has been made to show the influence exerted by the nature of the elements which form a chemical compound.

The book must be regarded from all points of view as a very good one and one that can be highly recommended for use in our colleges and universities. The facts are stated clearly, concisely, and correctly, and the latest information obtainable on the subject is always presented. Teachers of chemistry will find the book full of new ideas and suggestive of the relations of the various phenomena to one another that are usually overlooked in the ordinary text-book on the subject.

What the author has to say on the subject of valence in the preface to the book is very interesting. He says: "My views upon the subject of valence and the use of structural formulas may probably be regarded as too conservative by many of my colleagues, but I have been led to adopt these views by the growing conviction that the dogmatic use of supposed laws of valence and of constitutional formulas founded upon very incomplete experimental evidence, is causing more harm than good to the advancement of chemical science." Most of the teachers of chemistry will endorse the latter part of this statement. The author has made free use of the facts derived from the domain of the so-called physical chemistry wherever he has thought it advisable, and he has thus been able to present reasons for our views of certain chemical phenomena which would be otherwise perfectly inexplicable to the student.

Notwithstanding the general excellence of the book it has some minor faults. The use of the word ~~not-metal~~ throughout

the work when the word non-metal is in general use by chemists seems ill-advised and unwarranted. The same statement may be made also with reference to the word not-conductor. Hydroiodic acid and stibional are used instead of the more usual hydriodic acid and antimonyl and for no apparent reason. Hydrazine, hydroxylamine, azoimide, and methine are written without the final *e* probably because that is the German way of spelling these words and the author is more familiar with them in German than in English. No reference whatever is made to the preparation of the diamond artificially by Moissan and, in speaking of the preparation of the acid HN_3 , the simplest and best method of all that have been proposed, *viz.*, that of Wislizenus, by the action of nitrous oxide on sodium amide, is entirely omitted.

On page 278, near the bottom, occurs the following remarkable statement: "By a judicious combination of the iodides of organic radicles, carbon and hydrogen compounds containing as many as sixty *carbonates* in a molecule have been prepared." In a foot-note, Hill and Hägele are made responsible for this "judicious combination," but it is doubtful if these chemists would recognize their own statement in this form.

HN_3 is referred to as azoimide or hydrogen nitride and the salts of the acid are called nitrides. It would seem to the reviewer that a name which recalled the fact that the substance was an acid, would be preferable, and, since there are quite a large number of nitrides known which are certainly not salts of the acid HN_3 , much unnecessary confusion will be introduced by the use of the word nitride for a salt of the acid HN_3 . These are, however, but slight faults which may be readily corrected in the next edition of the book and that another edition of so excellent a work will soon be called for seems highly desirable and also highly probable.

The book is singularly free from typographical errors, is well printed and well bound, contains a useful appendix of laboratory notes intended as a guide to teachers and students in compiling a list of experiments, and last, but by no means least, a very complete index.

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