

tains a water solution of silver nitrate in a slight excess above that required for the chlorine content of the sample. The silver halide formed during the combustion and after the rinsing is filtered on a Gooch crucible, washed with warm 2% nitric acid and weighed as usual. For halogen alone, a Volhard titration can be made. In the combined determination, the filtrate and washing from the Gooch filtration are treated with an excess of hydrochloric acid to remove silver, and the filtered solution and wash waters then precipitated with barium chloride solution after the nitric acid has been removed, as described for the analysis for sulfur alone.

The amount of sample to be taken is from about 0.1 to 0.2 g. depending on the sulfur content; 0.1 g. suffices for 30–40% of sulfur. The combustion occupies 1½ to 2 hours; the process is shorter but more difficult when oxygen is used. Platinum is the only expensive equipment. There is no sealing of tube, high temperature, or danger of explosion as with the Carius method. The simultaneous determination of halogen and sulfur makes possible the use of a very small sample for analysis.

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## NEW BOOKS

**Zirconium and Its Compounds.** By FRANCIS P. VENABLE. American Chemical Society Monograph Series. The Chemical Catalog Company, Inc., 1 Madison Avenue, New York, U. S. A., 1922. 173 pp. 23.5 × 15.5 cm. Price \$2.50.

Although zirconium is an element of perhaps minor importance from the standpoint both of its abundance and of its useful applications, it is a matter of very great consequence to have our knowledge of it concentrated in this available form. This monograph is, therefore, a most important one in this very important series of Scientific and Technologic Monographs which is being prepared under the auspices of the American Chemical Society, and Dr. Venable and the Publishers may well feel that they have made a distinct contribution to chemical science.

The purpose of the author is expressed in the following extract from the preface:

"I have not sought to record every observation or detail given in the literature, many of which are faulty or erroneous, but only such as seemed to have an essential bearing on the subject. My purpose has been to give a systematic, clear, and sufficiently full account of the chemistry of zirconium which should prove useful in connection with the increasing interest attaching to the element."

The personality of the author would be sufficient assurance that this purpose has been accomplished and it is perhaps needless for the reviewer even to state his own opinion to that effect.

The list of chapter headings gives some idea of the method of treatment of the subject: I. History and Occurrence. II. Properties. III. Compounds with Hydrogen, Oxygen, Nitrogen, Carbon, Sulfur, Boron, Silicon, Phosphorus. IV. Compounds with the Halogens and their Acids. V. Compounds with the Acids of Sulfur and Selenium. VI. Compounds with Acids of the Nitrogen Group and Rare Inorganic Acids. VII. Compounds with Acids of the Silicon Group. VIII. Zirconic Acid and the Zirconates. IX. Compounds with Organic Acids and Radicals. X. Analytical Methods. XI. Technical Application. XII. Patents. Bibliography. Index. The subtopics of Chapter XI suggest the scope of the practical usefulness of the element: Precious Stones; Oxy-hydrogen Light; Gas Mantles; Incandescent Filaments; Alloys; Furnace Applications; Refractories; Enamels; Glass; Textile Applications; Colloidal Applications; Medicinal Use; Abrasive; Chlorinating Agent. Of all of these uses there appears to be only one in which zirconium or a zirconium compound is preëminently superior to anything else, namely the patented preparation "Kontrastin" which may be substituted for bismuthyl nitrate as a lining for the stomach, etc., in X-ray observations and radiographs. It has the advantage of being non-poisonous.

Scientifically, zirconium presents many interesting problems. It is a metallic element of great chemical activity, approaching that of aluminum; it has an almost invariable valence of 4; its base-forming properties are not strongly defined and its salts are very much subject to hydrolysis. Zirconyl salts comprise the best-defined compounds, but the preparation of well-defined zirconium compounds is difficult and the statements in the literature are conflicting. The remarkable colloidal nature of many zirconium preparations might suggest an opportunity for colloidal researches.

One finishes reading the monograph with the conviction that, in spite of the well-ordered presentation of our present knowledge of this element, there is open a great field for further accurate investigations.

ARTHUR A. BLANCHARD

**An Inorganic Chemistry.** By H. G. DENHAM, M.A., D.Sc., Ph.D. Professor of Chemistry, University of Capetown. Edward Arnold and Company, London; Longmans, Green and Company, 55 Fifth Avenue, New York, 1922. viii + 688 pp. 144 figs. 20.5 × 13 cm. Price \$4.00 net.

This text-book, designed to meet the requirements "for those taking the intermediate science examination of the Universities," follows conventional lines. It is characterized by its clear presentation of facts, and an unusually large number of excellent graphs, diagrams, illustrations and tables. The book is very well printed.

The presentation of the theoretical matter is, to our mind, less successful. A chapter on "The Quantitative Aspect of Chemistry" is placed just after

the brief introduction, as a formidable and unpalatable dose to be taken before any specific element or compound is actually studied. The subject of reaction velocity is not discussed seriously at all; naturally, therefore, when equilibrium is discussed at length near the middle of the book, the results are far from satisfactory. Van der Waals' theory, and critical phenomena are discussed *before* the kinetic theory or molecular weights have been studied. There is also but little attempt made to relate the subject matter to the everyday world of the student. Part of this tendency is evident in the relatively slight emphasis placed on technical processes of manufacture. Thus, for instance, only about 25 lines are devoted to the synthesis and decomposition of ammonia and to the Haber process. This is less than is allotted to hypophosphorous acid, or to antimony trioxide, or to the thio-arsenites.

ARTHUR B. LAMB

**The Newer Knowledge of Nutrition: The Use of Food for the Preservation of Vitality and Health.** By E. V. McCOLLUM, Ph.D., Sc.D., Professor of Chemical Hygiene in the School of Hygiene and Public Health, of the Johns Hopkins University, Baltimore, Maryland. Second edition, entirely rewritten. The Macmillan Company, New York, 1922, xviii + 449 pp. 20 figs. 15 × 23 cm. Price \$3.80.

The growth in the "newer knowledge of nutrition" within recent years is substantially represented by the growth of Dr. McCollum's book since its first edition in 1918. The present edition, however, is frankly presented as a critical review of the experimental work in this field which has appeared in the last 15 years. As stated in the preface, "It has seemed to the author that there is great need of a careful and critical interpretation of the existing data relating to nutrition, in order that the science may appear in its proper perspective. It was with this objective that the present volume was written. In order that the subject might be clarified it was necessary that elements of weakness in a considerable amount of experimental data be pointed out."

The critical point of view adopted by Dr. McCollum in this edition makes the book a valuable one for the student of nutrition although the thoughtful reader will admit that the result contains a certain element of danger if it is not recognized that the criticisms are those of the author. Dr. McCollum's book, at least certain portions of it, therefore, may prove to be of greater value to the close student of the subject than to the non-professional reader who is likely to be confused by some of the criticisms advanced.

Although Dr. McCollum has drawn very extensively from his own published researches with experimental animals, chiefly rats, for support of the ideas which he advances, he has not spared his own work from criticism. His earlier positive views that a vitamin etiology in scurvy, pellagra and rickets could not be acceptable have been changed and his error

frankly admitted, at least, in the case of scurvy. In view of these changes of opinion within the last 2 or 3 years, the writer wonders whether Dr. McCollum is not too conservative in his present view that all the important facts have now been discovered in connection with the field of nutrition.

The various topics covered in the first edition have been greatly expanded in the present book. These comprise the "Biological Method for the Analysis of a Food-stuff," "The Vegetarian Diet," "The Dietary Deficiency Diseases," and "The Nursing Mother as a Factor of Safety in the Nutrition of the Suckling." The additional subjects include an exhaustive criticism of the work on protein nutrition, a consideration of the chemical nature and properties of the vitamins, and a very interesting presentation of the dietary habits of various races of people. The recent advances in connection with the etiology of rickets and related bone diseases are adequately treated, as well as the importance of diet in preventive dentistry.

The several topics considered in the separate chapters are discussed both specifically and with reference to their relation to the general subject of the newer knowledge. Bibliographies are given at the close of each chapter rather than in a separate section of the book. This style of presentation has a number of advantages for the study of a particular phase of the subject, but involves considerable repetition of subject matter for the book as a whole.

Dr. McCollum's researches with the rat as his experimental subject have convinced him that a correct diet is the most important of all factors in the preservation of vitality and health of individuals as well as nations. Some of the most interesting parts of his book are devoted to the thesis that various states of illness, both mental and physical, are to be attributed to faulty diet and not to disease. He believes that a correct diet can be reduced to very simple terms, namely, the liberal use of milk (at least a liter a day per capita) and the practice of eating a certain amount of vegetable food twice a day in the form of greens and salads, in addition to an ordinary diet of milled cereal products, tubers, roots, meats, etc.

Every student of nutrition will want Dr. McCollum's critical review of the newer knowledge of nutrition. It will also find a wide use among health officials and others who will not be confused by the critical nature of the presentation of certain phases of the subject matter.

L. S. PALMER