

One of us (S.-K. K.) is indebted to the International Health Board of the Rockefeller Foundation for a fellowship during the tenure of which the work here reported was carried out.

Summary

1. Repeated boiling with permanganate in acetone solution removes completely the pro-vitamin from cholesterol. Cholesterol purified in this way and irradiated is inactive antirachitically even in large doses.

2. The photochemical formation of vitamin D from ergosterol under the action of monochromatic light has been studied quantitatively for different lines.

3. The quantity of radiant energy necessary to form an amount of vitamin D sufficient to cause a demonstrable deposition of calcium in the bones of a rachitic rat has been found to be constant over a wide range of radiations, 700-1000 ergs being necessary for the 256, 265, 280 and 293 $m\mu$ lines.

4. The quantum efficiency was independent of the state in which ergosterol was irradiated, the results being the same for irradiation of the solid or of solutions in alcohol of varying concentration.

5. The quantum efficiency was the same for ergosterol acetate as for ergosterol. The hydroxyl group plays no role in the process of activation.

MADISON, WISCONSIN

NEW BOOKS

Crystallographic Tables for the Determination of Minerals. BY VICTOR GOLDSCHMIDT, Heidelberg, and SAMUEL G. GORDON, Philadelphia. Academy of Natural Sciences, Philadelphia, 1928. 70 pp. 17 × 26 cm. Price, \$1.50.

In accordance with one of the fundamental principles of crystallography, the angles of every crystallized compound are constant and, except in the cubic system, characteristic of that compound. Angle measurement should accordingly constitute a useful method for the identification of unknown substances. Owing, however, to the existence of freedom of choice as to orientation and as to the unit forms, this method has never come into general use. Previous attempts to arrange crystals in determinative tables have either covered too few compounds or have been too complicated for anyone but the author and his immediate associates to use. In the present publication an effort is made to improve upon existing tabulations (without, however, giving any credit to earlier workers), over a thousand minerals being arranged according to crystal system, with data as to crystallographic constants, composition, specific gravity, hardness and miscellaneous properties.

When any new mineralogic work appears, it is the reviewer's custom, for judging how carefully it has been prepared, to look up at once what

composition is given for bornite, boulangerite and chilenite, how "erythro calcite" is spelled and what specific gravity is assigned to epididymite; for errors, made in these in one of the standard reference works, are usually copied faithfully from one compilation to the next. In the present work three out of five of these errors have been avoided, indicating that more than the average amount of attention has been given to getting the data correct.

The minerals are arranged in these tables, for the most part, in the order of increasing value of some coördinate. Allowance is made for differences in choice of orientation by including the values for several of the orientations possible in each system. No consideration is given, however, to difference in choice of unit forms, so the tables will be most useful to those workers who possess the happy faculty of guessing correctly which forms of a crystal to be identified have been selected as the units by the authors.

EDGAR T. WHERRY

Colloid Symposium Monograph. Papers presented at the Fifth National Symposium on Colloid Chemistry, University of Michigan, June, 1927. Edited by Harry Boyer Weiser, Professor of Chemistry, The Rice Institute. The Chemical Catalog Company, Inc., 419 Fourth Avenue, New York, 1928. 394 pp. Illustrated. 16 × 23.5 cm. Price \$6.50.

The continued prodigious increase in the extent and variety of our scientific knowledge is, of course, gratifying. To the student of science, however, who is attempting to gain or to maintain a grasp of his subject, this increase is somewhat disconcerting and disheartening. It would be utterly so, were it not that new generalizations and correlations are also being constantly made which, at one stroke, bring whole groups of facts within his comprehension.

Colloid chemistry represents such a generalizing and correlating development in chemistry. It strikes across the whole domain of organic and inorganic chemistry, illuminating many otherwise inexplicable phenomena.

This function of colloid chemistry is particularly apparent in the collection of twenty-four papers read at the Fifth National Symposium on Colloid Chemistry held at the University of Michigan and published in this Monograph. About half of the papers deal with general problems of colloidal chemistry; the others cover applications of colloidal chemistry to the most varied subjects: for instance, to the mechanism by which the kidneys operate, to the coagulation of gelatin, the winter hardness of insects, the manufacture of photographic film, the eccentricities of molding sand and the nature of Portland cement. It is a useful collection.

One cannot, however, but wonder why this collection is called a monograph.

ARTHUR B. LAMB

Mechanochemistry and the Colloid Mill, Including the Practical Applications of Fine Dispersion. By PIERCE M. TRAVIS, President, Travis Colloid Research Co., Inc. The Chemical Catalog Company, Inc., 419 Fourth Avenue, New York, 1928. 191 pp. 17 figs. 16 × 23.5 cm. Price \$4.00.

As stated by the author, the book was written in an attempt to help eliminate the guess method in operations that involve the dispersion or deflocculation of substances by mechanical means. The name "Mechanochemistry" was chosen because the subject matter includes a discussion of the principles that underlie such processes, as well as a description of the Colloid Mill and its functions.

The first thirteen chapters are devoted to the usual facts and theories involved in a discussion of the colloidal state of matter, and technical applications are frequently referred to. So much ground is covered in these chapters that the discussion is often necessarily limited; nevertheless, the author's very clear and concise style has permitted the inclusion of a vast amount of valuable information. For the accomplishment of the author's purpose, Chapter XII on the theory of emulsions is worthy of special mention.

While the early chapters, dealing largely with the theoretical side of the question, will be found of very great value to those engaged in technical practice, they are to be highly recommended to the beginner in the study of colloid chemistry.

Chapter XIV is an excellent presentation of the construction and functions of the Colloid Mill. The particular advantages or limitations of the various types for specific purposes are clearly pointed out.

Chapter XV deals with methods and standard practices that may be employed in the testing of colloidal systems. Both the student and the technical chemist will find this chapter very helpful.

ELLWOOD B. SPEAR

Über Konstitution und Zusammenhänge in der Sesquiterpenreihe. (The Constitution and Relationships of the Sesquiterpenes.) By DR. L. RUZICKA, Professor at the University of Utrecht. Fortschritte der Chemie, Physik und Physikalischen Chemie, Band 19, Heft 5, Serie A. Gebrüder Borntraeger, W 35 Schöneberger ufer 12 a, Berlin, Germany, 1928. iii + 57 pp. 16.5 × 25.5 cm. Price, M 4.80.

In view of the fact that the number of sesquiterpenes discovered in various ethereal oils has increased during the past eight or ten years to over 400, such a résumé as this is timely. No attempt is made to cover the general chemistry of the substances in this field. The author has taken up in particular the reactions leading to a knowledge of the structure of the carbon skeleton of these compounds, the correlation of the various sesquiterpenes, the relationship between the various individuals and the synthesis of a few of the most important ones.

An introductory chapter mentions in brief the work which was accom-

plished before 1921. The rest of the article comprises, for the most part a condensation of the author's brilliant researches which have been completed during the past six or seven years. The value for constitutional work of the dehydrogenation method with sulfur has been stressed. A classification and tabulation of the various important groups of sesquiterpenes is included.

For one who may be interested in obtaining a fundamental knowledge of sesquiterpenes from the standpoint of structure, this pamphlet will be invaluable.

ROGER ADAMS

Die Chemie der Zellulose und ihrer Begleiter. (The Chemistry of Cellulose and its Associated Compounds.) By KURT HESS, Member of the Kaiser Wilhelm Institute of Chemistry. Akademische Verlagsgesellschaft m.b.H., Markgrafenstrasse 4, Leipzig C 1, Germany, 1928. xxi + 836 pp. 157 figs. 16 × 23.5 cm. Price, unbound, M 57; bound, M 59.

The long expected *magnum opus* from the pen of Professor Hess has finally appeared and will rank for some time to come as the outstanding monograph on the chemistry of cellulose. After a brief introduction and a chapter on the development of the cell wall, the author plunges into a comprehensive review of compounds associated with cellulose, their isolation and analysis, and reactions which throw some light on their possible constitution. Not a little of this long chapter is devoted to lignin and rounds out Fuchs' excellent monograph on lignin by including the very recent and important investigations of Freudenberg, Hägglund, and Herzog.

Subsequently we find a good review of the isolation and purification of cellulose and its solution and reprecipitation. Here, as we might expect, the cuprammonium solutions are discussed at length, since their polarimetric study first led Hess to the hypothesis that the ultimate cellulose molecule is $[C_6H_{10}O_5]$, an hypothesis which he still maintains. Substitution products of cellulose also receive particular attention since Hess' laboratory has systematically studied cellulose esters and ethers, obtaining them in microcrystalline form and determining their molecular weights in various solvents. One of the longest sections in the book is devoted to the degradation of cellulose and here again the work of Hess' laboratory is brought to the fore. An interesting section deals with cellulose acetolysis in which, according to Friese and Hess, cellobiosan acetate is the exclusive product in the earlier stages of the reaction. The final section of Hess' portion of the work is devoted to problems of constitution, in which the author points out experimental methods for determining the possible size of the cellulose molecule. He ends in expressing the hope that researches on the synthesis of glucosans will be forthcoming in the near future.

Professor Hess has been fortunate in his choice of collaborators. Dr. J. R. Katz of the University of Amsterdam has added a thorough and

Scholarly presentation of the micellar theory and the swelling of cellulose, which is very welcome. A chapter presented historically, on the anisotropy of cellulose, is followed by another which Dr. Katz entitles "Is Cellulose a Crystalline Body?" and which includes detailed x-ray studies on natural fibers and on cellulose derivatives, and a useful supplement on the technique used in this type of work. Subsequently Dr. Katz critically and cautiously discusses various estimates of the size and arrangement of crystallites in cellulose fibers. The final and perhaps the most stimulating part of Dr. Katz' section of the book is devoted to the mechanism of swelling of cellulose, and merits a careful reading by all investigators in the field of cellulose chemistry.

In the very last portion of Dr. Hess' book we find a satisfactory chapter by Dr. R. Haller on the behavior of cotton and artificial cellulose fibers toward dyes.

Some cellulose chemists may take issue with Dr. Hess on certain of his hypotheses and feel that the experimental data presented in their support are quite inadequate. However, these very hypotheses are driving Hess' more cautious colleagues into new and untried fields of investigation, and for this alone he deserves their unstinted praise. He has given them an interesting reference book, the importance of which is beyond question.

LOUIS E. WISE

Fundamentals of Dairy Science. BY ASSOCIATES OF LORE A. ROGERS IN THE RESEARCH LABORATORIES OF THE BUREAU OF DAIRY INDUSTRY, United States Department of Agriculture. American Chemical Society Monograph Series. The Chemical Catalog Company, Inc., 419 Fourth Avenue, New York, 1928. 543 pp. 31 figs. 15.5 × 23.5 cm. Price, \$5.50.

This book, it can be safely stated, is the most notable contribution that has been made to the literature of dairy science. It is unique in purpose and plan. It represents the successful accomplishment of a very difficult task. It is eminently satisfactory in filling "a need experienced by advanced students and research workers in the field of dairy science" and in presenting "basic data, fundamental observations and unbiased discussions of researches that contribute to the present status of the dairy industry." It cannot fail in its hope "to stimulate research along lines now lagging, thereby correcting somewhat the lack of balance in our knowledge of the scientific basis of the dairy industry."

In the discussion of milk and milk products, the book, comprising 542 pages, is divided into 4 parts and 15 chapters—(1) the constituents (5 chapters), (2) the physical chemistry (4 chapters), (3) the microbiology (4 chapters) and (4) the nutritional value and the physiology of milk secretion (2 chapters).

Twenty-eight present and former associates of Dr. Rogers contributed

to the book. In five chapters there was one writer for each, while in the others the work was divided, two to six writers contributing to each chapter.

A superficial examination without knowing the purposed scope of the book as stated in the preface might lead one to think that some subjects were very inadequately treated as, for example, the composition of milk and milk products, but the book is intended only for those who are already familiar with the elementary facts of dairy science.

When one reads studiously, the impression gains that the editorial committee has shown excellent judgment in compositing the contributions of the different writers for the purpose of unifying the general scheme of the book. To avoid producing an encyclopedia, much restraint must have been exercised by the contributors.

Those interested in dairy chemistry will find a stimulating presentation in the first and second parts, especially the chapters discussing "Acid-Base and Oxidation-Reduction Equilibria of Milk" and "Physical Equilibria of Milk." It is a gratification to find in the chapter on "Metabolism and Growth of Bacteria" more than usual attention given to the chemical reactions taking place in different fermentations.

The reviewer of a book of such exceptional value hesitates to offer any criticism. However, it is his duty to call attention to the erroneous statement on page 211, "The free paracasein in cheddar cheese is soluble in a warm 5 per cent. salt solution, while the paracasein lactate produced by the acid in cottage cheese is insoluble in similar solutions," making reference to Bulletin 261, N. Y. (Geneva) Agr. Exp. Sta., 1905. Later work at the same station annihilated the existence of supposed casein and paracasein lactate (Tech. B. No. 3, 1906), while the substance soluble in warm, dilute solution of sodium chloride was shown in 1912 (Tech. B. No. 26) to be not free paracasein but a compound of paracasein with a minimum amount of calcium.

While the references to literature number over 1300, there are some statements of fundamental facts which are not recognized by proper references.

The book accomplishes an important purpose in revealing how much we do not yet know in the different fields of dairy science. The reviewer, in expressing his own personal gratitude to those who have made possible the preparation of this valuable book, represents the attitude of mind of every one who will have occasion to use it. The dedication of the book to Dr. Rogers in recognition of his twenty-five years of service in his present position is an honor well deserved.

L. L. VAN SLYKE