

To confirm this result, the branched-chain saccharin was condensed with *o*-phenylenediamine to give an anhydro-saccharin benzimidazole (m.p. 240–241°; C, 61.3, H, 6.00) and the latter was oxidized to benzimidazole carboxylic acid (C-1, C-2). Decarboxylation of the benzimidazole carboxylic acid confirmed that nearly 60% of the original radioactivity had been located in the tertiary carbon (C-2). This result is incompatible with the benzoic acid rearrangement mechanism as postulated by Nef and Isbell, but is compatible with a recombination mechanism involving sugar fragments whose identity is not yet known with certainty.

1-C¹⁴-D-Galactose⁵ was converted by the action of saturated lime-water at room temperature to C¹⁴-“D-galacto- α -metasaccharinic acid.”⁶ A Ruff degradation of the latter⁶ and radio-assay of the resulting D-threo-2-deoxypentose as the benzylphenylhydrazone⁷ showed that less than 5% of the

(5) Obtained from the National Bureau of Standards through the courtesy of Dr. H. S. Isbell.

(6) H. Kiliani and H. Naegell, *Ber.*, **35**, 3528 (1902).

(7) P. A. Levene and T. Mori, *J. Biol. Chem.*, **83**, 803 (1929).

original radioactivity was located in this 5-carbon fragment (C-2, C-3, C-4, C-5, C-6). To confirm this result, the straight-chain saccharin was converted to its benzimidazole derivative (m.p. 186–187°; C, 57.1, H, 6.53) and the latter converted, by oxidation followed by decarboxylation, to benzimidazole (C-1). Approximately 95% of the original radioactivity was found in this derivative. This result is compatible with the benzoic acid rearrangement mechanism of Nef and Isbell.

Further work is in progress with other saccharinic acids to generalize the results reported here and to clarify the mechanism of formation of the branched-chain “D-glucosaccharin.”

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RECEIVED APRIL 18, 1953

BOOK REVIEWS

Charbons Actives (Adsorption des Gaz et des Vapeurs). By C. COURTY, Professeur de Chimie Physique, à la Faculté des Sciences de Lyon. Gauthier-Villars, 55 Quai des Grands-Augustins, Paris (6^e), France. 1952. ix + 534 pp. 16.5 × 25 cm. Price, 4,500 fr.

This rather long book is essentially an expansion of some notes that related to war-time work on gas masks. The theoretical parts have been expanded to the limit, but the experimental data that are used as examples remain confined to charcoal; even carbon black is excluded. Now as Professor Duclaux points out in the preface, most adsorption theories have little to do with the chemical nature of the adsorbent, and so in the reviewer's opinion the scheme of the book is unsound.

Most of the theoretical material presented is rather old; for example the 1943 paper of Emmett and de Witt is a high water mark for the work of this school. However, the 563 references, and the exhaustive treatment of semi-practical rate problems will make this book very interesting to people working directly in the field of active carbons.

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Die Physik der Hochpolymeren. Volume I. Die Struktur des Freien Moleküls—Allgemeine Physikalische Methoden zur Bestimmung der Struktur von Molekülen und ihre Wichtigsten Ergebnisse. By H. A. STUART, Früher O. Professor der Physik an der Technischen Hochschule Dresden, Z. Zt. Hannover. Springer-Verlag, Reichpietschufer 20, Berlin W 35, Germany. 1952. xxi + 609 pp. 16.5 × 23.5 cm. Price, DM 69.

This volume should be very useful as a reference work to everyone, such as the writer, who is interested in the structure of molecules and the methods of molecular structure investigation, as well as to the high polymer chemist. It is the most comprehensive, critical and up-to-date review of this subject with which this writer is acquainted.

According to the preface it was undertaken because of the dependence of structural investigations of polymers on purely physical methods. Consequently, Prof. Stuart has undertaken to collect the available structural information which these methods have yielded on small molecules and to examine critically the available methods for studying the structure of molecules. Various sections of the book have been written by G. Scheibe, W. Maier and J. Juilfs. The extent of the survey is indicated by the chapter headings: I. Valence and Molecular Forces, (79 pp.); II. The Size and Shape of Molecules, (23 pp.); III. The Nuclear Framework of Molecules, (80 pp.); IV. The Internal Mobility of Molecules and Their Statistical Shape, (63 pp.); V. Dielectric Constants, Electric Moment and Molecular Structure, (89 pp.); VI. Light Scattering, Polarizability, and Molecular Structure, (78 pp.); VII. Electrical Double-Refraction, Optical Anisotropy and Molecular Structure, (49 pp.); VIII. Characteristic Vibrations of the Nuclear Framework, (109 pp.); IX. Light Absorption and Constitution, (13 pp.).

The thoroughness with which the literature on these numerous topics is covered is impressive; in general the references seem quite complete up to about 1950 and some are as recent as 1951. For example, there is an excellent short summary of the results obtained in the very current field, microwave spectroscopy. The results are conveniently compiled in 129 tables, many of them available elsewhere, but some of them unique. In the section entitled “Stability of Internuclear Distances and Valence Angles,” for example, the energy necessary to deform molecules is tabulated for a number of characteristic linkages. These energies are calculated straightforwardly from force constants (also given), to be sure, but this reviewer found it most enlightening to realize that the energy necessary to deform many bond angles by 5.73° was less than 500 cal./mole.

Naturally, as in any such compilation, occasional minor errors have crept in. (Rollefson's determinations of the dipole moments of HCl and DCl from infrared dispersion are referred to as Stark-Effect measurements in Table 57.) The number of such errors appears to be remarkably small; this,

together with the very small number of misprints, attests to very careful editing.

Aside from the quantity of information gathered, the discussion of the data and their significance is clear, comprehensive and critical. Many of the bond energies are given for two of the possible heats of sublimation of carbon, and a clear, careful distinction is made between such terms as "bond energy" and "bond dissociation energy."

One of the most useful features of the book, particularly for the student entering the field of molecular structure, is the compilation at the end of each chapter of the major books and review articles on the field of that chapter. In general, some ten to thirty-five significant works are included in each list.

Very little in this book is new. Nevertheless, the very quantity of the comparative data assembled affords new insights to the discerning reader. From the standpoint of the chemist interested in the structure of small molecules the emphasis in the book is not ideal; rather more space and attention is given to older techniques such as dipole moments, optical anisotropy, or light scattering than their present importance relative to newer, more exact methods seems to justify. However, this emphasis is probably justified by the orientation of this volume toward high polymers. Nevertheless, it is unfortunate that such methods as nuclear magnetic resonance or the direct measurements of quadrupole coupling in solids are not mentioned. They are not only important already in the structural study of simple molecules but there seems good reason to believe that they may be valuable in the study of polymers.

The field covered by this book is one in which prodigious amounts of material have accumulated in recent years. If this reviewer has seemed carried away and over-enthusiastic, he can only say that he knows of no better organized or more comprehensive survey to put in the hands of his own students.

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D. F. HORNIG

Kolloid-Tagung, Köln 1951. By PROF. DR. HANS ERBRING (Editor). Verlag Dr. Dietrich Steinkoff, Darmstadt, West Germany. 1952. iv + 227 pp. 19.5 × 27 cm. Price, DM 30.

This volume contains thirty-one of the thirty-three papers on various aspects of colloid chemistry which were presented at the "Kolloid-Tagung" in Cologne, September 29-30, 1951. All of these articles were published in Volumes 124-126 of the *Kolloid-Zeitschrift*, and are here reprinted as the 15th volume of the proceedings of the "Colloid Society."

The authors of the thirty-one papers come from nine nations, and the entire set of articles presents an impressive international picture illustrating the diversified aspects of the broad field of pure and applied colloid chemistry. Readers especially interested in this subject will welcome an opportunity to secure all of these papers under one cover.

Although many of the papers in this volume contain new material, others are review in character. The oral presentation of review material at meetings by distinguished investigators may serve a useful purpose in stimulating discussion and new research on the part of those attending the meeting. However, the present reviewer doubts the necessity or desirability of printing such review material in journals, inasmuch as the valuable journal space should be reserved for new work. A symposium is at times erroneously defined as a collection of review papers on a common topic. A more correct and useful definition would omit the word "review." Perhaps the best compromise would be to publish only new papers in the scientific journals, and, along with the new articles, such review papers as may stimulate readers not able to attend the meeting in person,

could be added to reprint volumes such as the one now under consideration.

Work described in this book of special interest to the reviewer includes measurement of the viscosity of molten sulfur at high temperatures by H. Specker, and a relationship between isoelectric point and a maximum in foaming capacity of ovalbumen sols (D. Peters). H. Thiele found soap solutions exhibiting negative streaming double refraction consisted of platelets, whereas positive streaming double refraction corresponds to threadlike particles. Karšulin and Stubičan report the synthesis of halloysite clays by the interaction of solutions of aluminum chloride or nitrate with sodium silicate at room temperature and a pH value of about 5, in the presence of "seeds" of halloysite. Space does not permit mention of numerous other new ideas and concepts which other authors discuss.

It is recommended that Volume 15 of this series be added to all reference shelves.

THE RICE INSTITUTE
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BOOKS RECEIVED

April 10, 1953-May 10, 1953

E. DE BARRY BARNETT AND C. L. WILSON. "Inorganic Chemistry." Longmans, Green, and Co., 55 Fifth Avenue, New York 3, N. Y. 1953. 512 pp. \$7.00.

CHARLES C. CLARK. "Hydrazine." First Edition. Mathieson Chemical Corporation, Baltimore, Maryland. 1953. 133 pp. \$3.00.

ADALBERT FARKAS (Edited by). "Physical Chemistry of the Hydrocarbons." Volume II. Academic Press Inc., Publishers, 125 East 23rd Street, New York 10, N. Y. 1953. 411 pp. \$9.00.

HENRY GILMAN (Editor-in-Chief). "Organic Chemistry—An Advanced Treatise." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1953. Volume III—580 pp. Volume IV—pp. 581-1245. \$3.75 each.

C. H. GRAY. "The Bile Pigments." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1953. 142 pp. \$1.75.

C. K. INGOLD. "Structure and Mechanism in Organic Chemistry." Cornell University Press, 124 Roberts Place, Ithaca, New York. 1953. 828 pp. \$9.75.

NATIONAL BUREAU OF STANDARDS HANDBOOK 52. "Maximum Permissible Amounts of Radioisotopes in the Human Body and Maximum Permissible Concentrations in Air and Water." Superintendent of Documents, Washington 25, D. C. 1953. 45 pp. 20 cents.

OLOF SAMUELSON. "Ion Exchangers in Analytical Chemistry." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1953. 291 pp. \$6.50.

ROMEO B. WAGNER AND HARRY D. ZOOK. "Synthetic Organic Chemistry." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1953. 887 pp. \$11.50.

F. WILD. "Estimation of Organic Compounds." Cambridge University Press, 32 East 57th Street, New York 22, N. Y. 1953. 239 pp. \$5.00.

GUY P. YOUMANS, LEONARD DOUB, AND ANNE S. YOUMANS. "The Bacteriostatic Activity of 3500 Organic Compounds for *Mycobacterium Tuberculosis* Var. *Hominis*." CBCC Review No. 4. Publications Office, National Research Council, 2101 Constitution Avenue, N.W., Washington 25, D. C. 1953. 713 pp. \$5.00.