

form. Only one radioactive peak was observed, which corresponded in position to authentic ceramide. When this radioactive material was hydrolyzed, and the hydrolysate was partitioned between water and chloroform, more than 90 per cent. of the radioactivity was found to be in the organic phase. Chromatography of the hydrolyzed chloroform-soluble material on silicic acid showed that the radioactive compound was eluted from the column in the same area as sphingosine.

Radioactivity in the ceramide decreased to less than half when coenzyme A instead of palmityl coenzyme A was added to the incubation mixture. In the absence of pyridine nucleotides the amount of tracer in the product also decreased. In several experiments, which are not shown here, addition of ATP caused a variable effect. Substitution of labeled phosphoserine for C¹⁴ serine caused a decrease to about one-third in the radioactivity of the ceramide fraction, indicating that phosphoserine is not an intermediate. Addition of non-labeled N-palmitylserine did not significantly change the amount of radioactivity in ceramide,

but when sphingosine was added, the incorporation of tracer was reduced to about one-half. Whether this indicates that sphingosine is an inhibitor or an intermediate in ceramide formation cannot yet be decided.

Burton and co-workers have shown that uridine diphosphogalactose is involved in cerebroside formation,⁶ and Sribney and Kennedy have found that cytidine diphosphocholine reacts with N-acyl sphingosine to form sphingomyelin.⁷ These results and those reported here suggest that ceramides are common intermediates in sphingolipid formation, as suggested earlier by Thannhauser and Reichel.⁸

(6) R. M. Burton, M. A. Sodd and R. O. Brady, *Federation Proc.* **16**, 161 (1957).

(7) M. Sribney and E. P. Kennedy, *ibid.*, **16**, 253 (1957).

(8) S. J. Thannhauser and M. Reichel, *J. Biol. Chem.*, **113**, 311 (1936).

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BOOK REVIEWS

Neuere Anschauungen der Organischen Chemie. Organische Chemie für Fortgeschrittene. Zweite Gänzlich Umgearbeitete Auflage. By EUGEN MÜLLER, O. Professor und Direktor des Instituts für Angewandte Chemie der Universität Tübingen. Springer-Verlag, Berlin W 35, Reichpietschufer 20 (West-Berlin), Germany. 1957. xii + 550 pp. 25 × 18 cm. Ganzleinen DM 59.60.

"Newer Views of Organic Chemistry" is an advanced textbook, the first edition of which was published in 1940 and was made available in this country through the Alien Property Custodian. The new edition is thoroughly revised and brought up-to-date, but in it is kept what is perhaps its most attractive feature, the organization of the material according to types of bonds. The three main subdivisions deal with single, double and triple bonds. For instance, the first main section starts with a qualitative discussion of valence, treating both the valence bond and molecular orbital approximations. This is followed by the carbon-hydrogen bond, where hybridization of bond orbitals is introduced, and a chapter on carbon-carbon single bonds. This chapter deals with paraffins and contains an excellent review of ring compounds, including conformational considerations, and optical activity. A discussion of carbon-halogen bonds follows, which allows the inclusion of substitution and displacement reactions and Walden inversion. The next chapter deals briefly with carbon-oxygen and carbon-sulfur bonds, and with oxonium salts, and sections on the carbon-nitrogen single bond, ammonium and sulfonium compounds, and the semi-polar link, including ylids, concludes the first large section. An analogous division is followed for double bonds (carbon-carbon and carbon-oxygen double bonds, conjugated and cumulative systems, tautomerism, aromatic chemistry) and for triple bonds (acetylenes, nitriles, cyanates), except that also nitrogen-nitrogen double bonds (azoxy and azo compounds) and triple bonds (aliphatic and aromatic diazonium compounds, azides) are included. A short chapter on bivalent carbon (carbon monoxide and derivatives, methylene) concludes the book. Each chapter is usually preceded by a short quantum-mechanical description of the nature of

the bond to be discussed, often with illustrations taken from Coulson's book. Although the conventional chapter on physical properties is omitted, use is made of such data, particularly dipole moments and bond distances and angles, in discussing the character of the various bonds. Ionic and radical reactions are treated side by side at the appropriate places.

The organization of the book has the advantage of being systematic, and the disadvantage, not too serious, that not everything in organic chemistry fits neatly into such a system. Thus, quantum-mechanical resonance is introduced only about one-third of the way through the book, in the discussion of olefins, hyperconjugation toward the end, and the Wagner-Meerwein and similar rearrangements are taken up in the section on aromatic substitution, in connection with the Friedel-Crafts reaction.

In contemporary organic chemistry various topics and ideas have received different treatment and particularly different emphasis in different countries, and the reader on this side of the Atlantic should not expect a literal translation of English-American developments into German. There are some topics and treatments which recur particularly in the German literature and also are given space here: the alternating effect, the development of mesomerism taking pyrylium salts as the starting point, the structure of the solid sodium salts of tautomeric substances, the great interest in diazomethane. Some topics, such as displacement or eliminations reactions, acid-base catalysis, the relation between structure and reactivity, are not treated as thoroughly as is customary in similar books, others, particularly reactions of acetylenic or nitrogen containing substances, or the oxo reaction, more thoroughly. A chapter found in the previous edition on stable free radicals, containing much of the author's own important contributions, has been omitted, but some of his earlier work on biradicals, and his more recent work on the tri-*t*-butylphenoxy radical, is mentioned. The reader will be surprised to see how many modern concepts are discussed under their English names, or are introduced under those names, *i.e.* orbitals, covalent radius, total bond order, staggered and eclipsed forms, transition state, bridged ions, sandwich structures.

The book is very much up-to-date; literature is covered up to 1955, and many recent developments are mentioned, such as non-classical carbonium ions, benzyne, isotactic and graft polymers, conformational analysis, steric acceleration, internal return, methylene, phosphorus ylids, to name some. Unfortunately, often these are only briefly mentioned, and this points to a weakness of the book. The scope is so large that rarely is a reaction or a thought fully developed. Those familiar with the field will not miss many topics, but they will miss important arguments leading to established mechanisms, and often they will question details of the mechanism or of the interpretation, sometimes also statements of fact (for example, the statement that cinnamic acid is nitrated in the *meta* position). In particular, the almost complete lack of kinetic, and often of relevant stereochemical, arguments makes the presentation of many mechanisms seem categorical.

The book is not the pioneering work that A. Werner's very similarly entitled "Neuere Anschauungen auf dem Gebiete der Anorganischen Chemie" was when it was published in 1905, but it is a commendable and interesting one, and one that will fill a need in the German chemical literature. The American reader will find that many topics are treated more thoroughly in available books or monographs, but he may enjoy reading a book, not of selected topics, but of wider scope, also traveling over less familiar avenues, which is written in a mature way and from a uniform point of view, even though some details may be open to debate. He will be particularly interested to see how the material is presented to German students.

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on page 75. There are other instances where a name is spelled differently in the body of the chapter and in the reference list. The following sentence; "The oxidation from a valence of 3-6 can be effected by relatively weak oxidants, such as ferric ion, iodine, and oxygen." makes no sense at all because the valence change of 3-6 was substituted for the change of 2-3 given in the textbook. On the same page diprotic is rendered "diroptic," the charges on three ions are wrong as is one of the equations on the same page. On page 60 we find "oxidizing flux will contain reducing substances such as Na_2O_2 , H_2O_2 or nitrates." Again on page 61 ammonium nitrate is given in place of ammonium nitrite. On pages 63 and 67 there are errors in formulas and the chemistry of the determination of chromium in the presence of vanadium (p. 63) is garbled.

In Section II the chapter, The Physical and Chemical Properties of Chromium Compounds, is the longest and most exhaustive, covering nearly 140 pages. A very large number of chromium compounds, mostly inorganic, are considered, but short accounts also of chromium salts of organic acids and organometallic compounds are included. The chapter is replete with tables and diagrams and has an extensive list of references. It should be a valuable source of information for chromium chemists and the general reader.

The remaining nine chapters of this section are short (10 to 30 pages). They contain brief but adequate, interesting general surveys of the fields covered. Flowsheets, charts, tables, illustrations and extensive lists of references are included.

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Chromium. Chemistry of Chromium and Its Compounds.

Volume I. Edited by MARVIN J. UDY, Chemical and Metallurgical Engineer, Niagara Falls, N. Y. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1956. xiii + 433 pp. 16 × 23.5 cm. Price, \$11.00.

This work is a new member of the American Chemical Society's series of Chemical Monographs, the first of which appeared in 1921. It is designed to cover the science and technology of chromium and its compounds. The preface calls attention to its difference from the usual monograph in that the various phases of chromium chemistry are covered by 36 different authors, making the book more like a series of monographs compiled in two volumes.

Volume I is divided into two sections. Section I is general and has five chapters on the history, mineralogy and geology of chromium, the relation of chromium to health, chromium in soils, plants and animals and the analytical chemistry of chromium. Section II with ten chapters comprises about three-fourths of the volume and bears the subtitle, Physical and Chemical Properties of Chromium Compounds, which is actually the subject matter of one chapter only. The remaining nine chapters deal with such topics as the production of chromium chemicals and their applications in the textile, tanning, oil and gas industries, in the graphic arts, in wood preservation and corrosion prevention.

This reviewer found the chapters in Section I, except the one on the analytical chemistry of chromium, well written and organized, informative, very interesting and remarkably free from typographical errors. References at the end of each chapter appear quite complete and up to date. The excellence of this section is, however, gravely marred by the form, content and numerous errors in the chapter on the analytical chemistry of chromium.

In attempting to bridge the gap between a review of the analytical chemistry of chromium and a compendium of the analytical methods for chromium the authors have landed in between with unhappy results. The account is, in part, too detailed to make a readable review yet lacks the details needed for the practical application of the procedures given. The main criticism, however, is that there are many errors in chemistry, formulas, spelling and English. To cite just one instance, errors of each kind, together with some loose writing, can all be found on page 57. Much of the material in the first two paragraphs on this page is a garbled excerpt taken from a textbook by Rieman, Neuss and Naiman. Incidentally the name of one of these authors is misspelled on page 57 and two of their names are misspelled

The Encyclopedia of Chemistry. GEORGE L. CLARK, Editor-in-Chief, Research Professor, University of Illinois, Urbana, Illinois, GESSNER G. HAWLEY, Executive Editor, Reinhold Book Division, New York, N. Y., and WILLIAM A. HAMOR, Advisory Editor, Director of Research, Mellon Institute, Pittsburgh, Pennsylvania. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1957. xvi + 1037 pp. 18 × 26 cm. Price, \$19.50.

With more than average courage, the authors of this book have undertaken the enormous task of bringing together in one volume fundamental information on the almost countless topics of chemistry and related fields. Topics are treated in alphabetical order and the scope of each is broadened by useful cross references. Contributions from over 500 authors, each a specialist in his field, are combined to make the book. Topics related to elements were listed as the element and compounds, except in those cases in which a group of compounds was important; these were listed as classes, *viz.*, Borates. In organic chemistry, compounds were listed as classes such as aldehydes, aliphatic compounds, excepting those compounds considered specially important. Fundamental areas of physical chemistry were treated as units excepting certain terms such as entropy, ϕH , free energy, which were listed as separate topics. The treatment of analytical chemistry is less obvious. Aside from such topics as analytical chemistry, analytical chemistry of radioactive elements, gravimetric analysis, titration and instrumentation and some material included incidental to other topics, this field of chemistry is not widely covered.

The editors have noted at least two major objectives, one, to preserve the function of an encyclopedia of chemistry by focusing each topic on the general subject of chemistry rather than a division of chemistry; and two, to present in an irreducible minimum of words, not only that material which has an essence of timeliness but also such fundamentals as will tend to prevent obsolescence after the book is published. The book is directed to "chemists, physicists, engineers, biologists, research workers, teachers and students who comprise the scientific population of the world." In order to understand the viewpoint of the authors, one should read the preface of this book. Having read the preface of the book, one is less likely to criticize seeming omissions in various topics or the choice of basic material included.

Three areas for which topics are provided must have unusual interest for the reader. These are: Names in Science, Scientific Societies and Research Institutes, Topics