
BOOK REVIEWS

Données Spectroscopiques Concernant les Molecules Diatomiques. By B. ROSEN, Rédaction Général. Hermann et Cie, 6, Rue de la Sorbonne, Paris V^e, France. 1951. 361 pp. 21 × 27 cm. Price, 4800 fr.

This systematic compilation of data on spectra of diatomic molecules is published under the joint sponsorship of the International Union of Pure and Applied Chemistry and the International Union of Astronomy. Complete references to the literature extend through July, 1951.

The tables of data are presented in alphabetical order of the molecular formulas, and give the following information about each molecular species, wherever the information is available.

- A. Methods of experimental production of spectra.
- B. Summary of known electronic transitions.
 1. Designation of transition and conditions of observation (absorption or emission or both).
 2. Light sources in which particular groups of band appear most favorably, lengths of absorption columns.
 3. Wave length limits of observation (usually down to 1500 Å.).
 4. Shading to red or violet.
 5. Origin of electronic transition where this is known, otherwise wave lengths of most prominent bands.
 6. Notes and references.
- C. Vibrational structure of each transition separately with assignment of vibrational quantum numbers, where this is known.
- D. Tables of constants for all known spectroscopic states, including energies of dissociation in some cases.
- E. Potential energy curves for some electronic states.
- F. A list of perturbations and predissociations, with the perturbed levels, predissociation limits and the perturbing state involved in the predissociation given when it is known.
- G. A complete bibliography of papers on the molecule (or ion), with notes about the principal content of individual papers.

The tables are preceded by complete explanation of their use, and by a discussion of spectroscopic notation and definition of symbols and constants.

The total number of diatomic molecules about which we have some information is certainly impressive. The principal value of the present tabulation is to collect in one place all the information which the research worker in spectroscopy and allied fields is likely to need, and consequently to eliminate searches through the literature, at least before 1951.

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The Lipids. Their Chemistry and Biochemistry. Volume I: Chemistry. By HARRY J. DEUEL, JR., Dean, Graduate School and Professor of Biochemistry, University of Southern California, Los Angeles. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1951. xxiv + 982 pp. 17 × 23.5 cm. Price, \$18.50.

This book of about 1000 pages contains a wealth of information useful to the lipid chemist and biochemist which has heretofore been scattered through a variety of books and journals often hard to find. It combines a full historical review of the work on the lipids with up-to-date information regarding properties and methods of study which are coming into wide use at the present time. Illustrative tables and charts are plentiful together with a full list of references.

Special attention is given to the "impurities" found in natural fats, namely, the fat-soluble vitamins and the fat colors, such as carotene, which are probably the mother substances of the vitamins.

The subject is discussed under the following headings.

- I. General characteristics and classification of the lipids.
- II. Chemistry of the fatty acids and glycerol including, the chemical nature, the physical properties and such topics as fatty acid films, spectral behavior, isomerism, crystal structure and reactions involving and not involving the carbonyl group.
- III. The chemistry of the neutral fats including synthesis from the fatty acids and from petroleum, the glyceride components of the natural fats, the constants used in identification, physical and chemical properties, rancidity, drying and hardening properties.
- IV. The waxes, including a discussion of the higher alcohols and sterols, glyceryl ethers, hydrocarbons and natural waxes.
- V. Chemistry of the phosphatides and cerebrosides, lecithins, cephalins, sphingomyelins, phosphatidic acids and acetal phosphatides, with a description of methods for the qualitative and quantitative study of these compounds.
- VI. The carotenoids—structure, properties, occurrence in plants and animals, and relation to the fat-soluble vitamins.

Four additional chapters, VII, VIII, IX and X, about 200 pages are devoted to the fat-soluble vitamins and provitamins A, D, E, K—distribution, properties and chemistry.

Coming at a time when interest in the lipids is considerable and rapidly increasing Dr. Deuel's book is especially timely.

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Elsevier's Encyclopaedia of Organic Chemistry. Series III. Carbocyclic Condensed Compounds. Supplement to Volume 14. Tetracyclic and Higher-Cyclic Compounds except Steroids and Triterpenes. By F. RADT (Editor). The Elsevier Press, 402 Lovett Boulevard, Houston, Texas. 1951. xxxi + pages 1S-938S. 19 × 25.5 cm. Price, Set Sub. \$66.00, Series Sub. \$77.00, Single Vol. \$88.00.

Each new volume of Elsevier bears fresh evidence that the editorial staff has attained an extraordinarily high level of ingenuity, accuracy and thoroughness in the very difficult task of assembling all known data on the properties and reactions of organic compounds. The magnitude of the undertaking can be seen from the fact that the volume under review, a Supplement to just that part of the original Volume 14 dealing with polyisocyclic compounds exclusive of steroids and polyterpenes, covers only the literature from 1937 to 1946 and yet embraces nearly one thousand pages. The tremendous expansion in this area is clearly due to active interest in a host of compounds investigated by virtue of their established or supposed carcinogenic action. Thus a dozen pages each are devoted to chemical and physiological researches on 20-methylcholanthrene and 1,2,5,6-dibenzanthracene in the 10-year period covered; the synthesis, chemical properties, and physiological actions of a tremendous shower of isomers and analogs are all duly reported.

To review a given field when it is at a peak of active interest is a difficult and challenging task. Elsevier has deliberately deferred the easier work of surveying areas that have quieted down and has repeatedly plunged into fields of active current interest. In consequence of this courageous policy and of the superb manner in which it has been implemented, Elsevier is making a major contribution to the further advancement of knowledge in the active fields concerned. As a worker in sterol chemistry, I can state that hardly a day goes by but that I consult Elsevier's Volume 14; I long for the day when the Steroid Supplement is at hand.

Anyone who has inspected a volume of Elsevier surely has been impressed with the beautifully printed formulas, the

ingeniously constructed charts and summarizing tables, the neat system for citation of references. Accumulating experiences impress me more and more with the extraordinary accuracy and thoroughness of the work. Several times, when Elsevier does not state the solvent in which a given determination of physical constant was conducted, I have looked up the original paper to see if the omission were not just an oversight and in the expectation of finding an indication of the solvent in the theoretical part or in a footnote, but I have always found Elsevier right and the author of the paper careless. In many instances the Elsevier staff has effected corrections in the existing literature through correspondence with investigators.

With the literature of organic chemistry expanding at an ever increasing pace, the superb surveys of Elsevier are a tremendous boon to science.

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Principles of Quantum Mechanics. Nonrelativistic Wave Mechanics with Illustrative Applications. By WILLIAM V. HOUSTON, The Rice Institute. McGraw-Hill Book Company, 330 West 42nd Street, New York 18, N. Y. 1951. vii + 288 pp. 16 × 23.5 cm. Price, \$6.00.

This book will be very useful to chemists as an introduction to quantum mechanics. The presentation is exceedingly clear, concise, and surprisingly free from mathematical difficulties. It is suitable as a text for a one-semester course on either a senior or first year graduate student level, provided that a careful selection is made of those sections in the book which would be omitted. I like the way Houston introduces quantum mechanics by giving a detailed account of the experimental background showing the inadequacy of classical mechanics and the electromagnetic theory, then giving a careful formulation of quantum mechanics as we now use it. He has lots of discussion of elementary problems in the text and examples for the students to work out for themselves. He has a good treatment of a particle in a box and a particle moving in a central field. However, his treatment of the spectra for one and two electron systems is really outstanding and will be appreciated by all those teaching quantum mechanics on an elementary level.

I am sorry that Houston does not mention molecules or chemical problems. However, this should not be a serious handicap in a one-semester course.

The book is somewhat surprising in the fact that it glosses over the spherical harmonics and other orthogonal sets of functions which form the background of practical quantum mechanics, and yet it contains a very detailed treatment of the electromagnetic equations and their use in radiation problems.

The second half of the book is geared to the interests of experimental physicists. Some of the topics covered are: collisions between two particles, scattering from various types of centers, quantum statistical mechanics, behavior of an electron gas, motion of an electron in a periodic potential, and the quantized field theory of electromagnetic radiation. The treatment is somewhat sketchy but it is very useful from the standpoint of getting the over-all bird's-eye picture without much effort.

Whether any individual chemist should buy this book depends on his personal interests. If he desires chemical applications, the answer is no. If he wants a thorough mathematical treatment, the answer is also no. But if he wants elementary quantum mechanics presented in a simple, palatable form, this book has much to offer.

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Anorganische Chemie auf physikalisch-chemischer Grundlage. By DR. PHIL. ALFONS KLEMENC, o. Professor an der Technischen Hochschule und Privatdozent an der Universität in Wien. Springer-Verlag, Molkerbastei 5, Vienna, Austria. 1951. xix + 430 pp. 16.5 × 23.5 cm. Price, \$5.70.

This book is designed as an introductory text for classes in inorganic chemistry, and is not used as a vehicle for pub-

lication of new research results. It is therefore of potential use only to that portion of the non-German-speaking chemical public which actively faces the problems of teaching such a course. For these Professor Klemenc's book may furnish material for thoughtful consideration.

The book is written for use by a lecturer who will occasionally assume the burden of supplying transition and detailed exposition. This, together with the assumption of an understanding of elementary mathematics which underlies the presentation, gives a certain feeling of intellectual sophistication which is too often lacking in elementary texts. Stress is placed on physical chemistry from the start, and the approach of the volume is decidedly "modern." As a matter of convenience for the author, each new subject met has been expounded to the limits of the volume's needs at that point, leaving to the teacher the selection of the proportion of the topic to be covered at that time. To facilitate return to topics for further and broader study, Klemenc has supplied a detailed and lengthy index of names and subjects. The text material itself is divided into some 60 units to which, because of the average brevity, one hesitates to apply the term chapters. This subdivision enables the author to elaborate on new topics without giving the sense of disorganization which might result if the material of a number of these units were enclosed in a single chapter of the conventional sort. Study of the volume is recommended to teachers on the alert for possible new ideas and approaches to introductory inorganic chemistry.

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Preparation, Properties, and Technology of Fluorine and Organic Fluoro Compounds. By CHARLES SLESSER, Ph.D. (Editor), Director, Division of Technical Information and Declassification Service, New York Operations Office, and STUART R. SCHRAM, B.A. (Associate Editor), Consultant, Division of Technical Information and Declassification Service, New York Operations Office, McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 18, N. Y. 1951. xxiii + 868 pp. 16.5 × 23.5 cm. Price, \$10.50.

This volume constitutes a part of the National Nuclear Energy Series describing the declassified work of the Manhattan Project and the Atomic Energy Commission. It concerns the work directed toward the production of stable, highly fluorinated, materials for use in the separation of uranium isotopes by the diffusion process.

The organization of the volume was dictated by the nature of the problem. Once it had been decided that fluorocarbons were uniquely satisfactory in the process, it became necessary to devise, as quickly as possible, methods of preparing by the ton materials which had before been made only by the gram. Several lines of attack were developed concurrently in many industrial and academic laboratories. In order to give adequate credit to the individual workers, the editors have included a large amount of duplication and reiteration which could not otherwise be justified.

The volume is divided into three major parts: (1) the preparation and handling of fluorine, (2) the preparation of fluorocarbons by direct fluorination, by replacement of chlorine and by polymerization of chlorotrifluoroethylene and (3) a discussion of the physical and chemical properties of the products.

Duplication is particularly noticeable in the first portion, the preparation of fluorine, where is presented one chapter each on laboratory generator studies, a 1000-ampere cell, a 1500-ampere cell and a 2000-ampere cell. The discussions and the conclusions reached, although of considerable value to anyone concerned with the generation of fluorine, are essentially the same in each chapter.

The portion devoted to the handling of fluorine covers, again with much repetition, some of the rather fantastic problems that arose and were solved in the handling of this most reactive of gases.

The section covering the work at Purdue University provides numerous detailed examples of chlorination of hydrocarbons and the exchange of fluorine for chlorine, to produce fluorocarbon chlorides that were almost as stable as the fluorocarbons. Pilot plant production of these compounds is also described.

The cobalt trifluoride fluorination process, developed at Johns Hopkins University under the direction of a theoretical physicist working as a chemical engineer, was found most practical for the preparation of completely fluorinated material. The general process, the use of alternative fluorides, and the preparation of large quantities of low boiling and high boiling liquid fluorocarbons are described in detail.

The most significant chapter is that by W. T. Miller concerning the preparation, physical properties and reactions of fluorinated olefins. Much of this work was carried on only so far as to indicate the interesting field ahead. While far less detailed than most of the book, it is likely to stimulate much new and valuable research.

The final chapters, with tables of physical properties, cover the first critical studies of a sufficient range of compounds to provide a satisfactory picture of the fluorocarbon field.

The volume as a whole is primarily of historical interest. Most of this work was published in the March, 1947, issue of *Industrial and Engineering Chemistry* and has been significantly improved in only a few cases. Had this book appeared five years ago, it would have been of great value in the development of fluorine chemistry. At the present time it serves as a more permanent record than the journal publication. A critical extended summary, eliminating duplication and evaluating the results, would have been very welcome.

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Gli Ormoni. *La Chimica—Il Metodi di Estrazione e di Sintesi—Il Metabolismo e L'azione Biological La Tecnica Farmaceutica—Accenni Alla Clinica.* BY EDGARDO PACE. Ulrico Hoepli, Editore, Milan, Italy. 1952. xv + 543 pp. 18 X 25 cm. Price, L. 3500.

The author, known in Italy for his earlier work "Le Vitamine," has the ability to write simple and directly, so that a person with only a limited knowledge of Italian can read the book with little or no difficulty. The first chapter of 38 pages serves to give the reader an idea of the scope of the work. Most of the subject matter is discussed in greater detail in the subsequent chapters. About two-thirds of the book is devoted to the hormones of the phenanthrene group, including a discussion of the sterols, bile acids, the sex hormones and adrenal hormones. Approximately one-third of the book is devoted to the other known hormones, including a discussion of the hormones of the pancreas, thyroid, pituitary, parathyroid and thymus, with major emphasis on the first three. A short appendix of about 10 pages deals with plant hormones. Numerous references appear throughout the book.

The author has included detailed laboratory procedures for the extraction of the hormones from the various glands, and he has outlined in some cases detailed tests for their assay, so that the book can fulfill the function of a laboratory manual in a limited sense. He has seen fit to include laboratory procedures for the preparation of testosterone and thyroxin. He also deals briefly with pharmaceutical preparations containing the hormones. The appearance of this information may be somewhat surprising in a book which is mainly expository in nature, but the procedure may be justified by the exigencies of the situation in Italy where library facilities and literature sources may be relatively difficult to obtain.

The author has succeeded in integrating the biological aspects of these important substances with their chemistry, so that the chemist can obtain an over-all picture. This feature is sometimes lacking in works dealing with the chemistry of biological substances. For example, the average chemist is rather naïve concerning the hormonal changes that occur during the menstrual cycle, although he may be able to expound masterfully on the structure of the sex hormones.

It is unfortunate that this integration of biology and chemistry is marred by a considerable number of errors in the latter field. Some of these are typographical in nature. One of the more serious errors deals with ergosterol. On

page 56 an erroneous formula for ergosterol is depicted, and an explanation is given in the subsequent text based on this erroneous formula. The situation is surprising inasmuch as the correct formula appears later on page 68.

Changes of nomenclature for the same substance are observed to occur within a space of several paragraphs. "Ergostérol" on page 69 becomes "ergosterina" on page 70; "dehydroisoandrosterone" on page 190 becomes "dehydro-epi-androsterone" on page 191; "epicholestanol" on page 112 becomes "epi-dihydrocholesterol" on page 113. This variation in nomenclature is, of course, familiar to those working in the field but must be confusing to the student and uninitiated. These latter would also have been assisted greatly if the formulas had been numbered more frequently to insure an easier correlation of formula and text.

On a number of occasions the author has repeated information given elsewhere in the book. Whereas some of this repetition can be justified on a pedagogic basis, a certain amount is unnecessary. For example, the formula for chrysenes is depicted twice on a page containing only three formulas. Two almost identical tables showing the amino acid content of insulin appear within a space of three pages. Certain physical data for ergosterol are given on one page, followed by slightly different values on the next page.

In dealing with the synthesis of estrone, the works of Bachmann and of Marker are described, but no mention is made of the elegant work of Anner and Miescher. Again in the discussion of the adrenal hormones, very little information is given on the introduction of the oxygen atom at C₁₁. It would also have been of interest if the author in his discussion of the thyroid had included information concerning the effect of various thyronine derivatives and thyroid blocking agents. The reviewer, of course, cannot assess adequately the contribution of this book to Italian scientific literature, but he doubts that it can take the place of corresponding works in the English language. A future edition with more careful organization may well remove the deficiency.

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BOOKS RECEIVED

April 10, 1952—May 10, 1952

- ROBERT C. ELDERFIELD (editor). "Heterocyclic Compounds." Volumes 3 and 4. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1952. Volume 3, 442 pp. \$12.00. Volume 4, 674 pp. \$17.00.
- H. GYSEL. "Tables of Percentage Composition of Organic Compounds." Verlag Birkhauser, Basel, Switzerland. 1951. 125 Swiss fr.
- WALTER HÜCKEL. "Structural Chemistry of Inorganic Compounds." Volume II. Elsevier Press, 402 Lovett Boulevard, Houston, Texas. 1951. pp. 441-1094. \$13.50.
- D. H. KILLEFFER AND ARTHUR LINZ. "Molybdenum Compounds—Their Chemistry and Technology." Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1952. 407 pp. \$10.50.
- R. H. F. MANSKE AND H. L. HOLMES (Edited by). "The Alkaloids—Chemistry and Physiology." Volume II. Academic Press Inc., 125 East 23rd Street, New York 10, N. Y. 1952. 587 pp. \$14.50.
- BRIAN MASON. "Principles of Geochemistry." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1952. 276 pp. \$5.00.
- PROCEEDINGS OF THE LONDON CONFERENCE ON OPTICAL INSTRUMENTS—1950. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1952. 264 pp. \$7.00.
- HAROLD WITTCOFF. "The Phosphatides." Reinhold Publishing Corporation, 330 West 42nd Street, New York, N. Y. 1951. 564 pp. \$10.00.