

Synthetic Methods of Organic Chemistry. An Annual Survey. Volume 8. By W. THEILHEIMER. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1954. xv + 508 pp. 16.5 X 23.5 cm. Price, \$18.90.

The eighth annual survey by Theilheimer includes a review of synthetic methods published from 1951 to 1953 and a cumulative index for volumes 6 to 8. A new feature, "Trends in Synthetic Organic Chemistry," has been added to this volume. It is an all-too-short chapter which scarcely more than mentions a few of the subjects receiving current emphasis, such as: metal hydrides as reducing and condensing agents, ion exchange resins as catalysts and for isolation and purification of compounds, perfluoro compounds, halogen-metal interconversions, and the like. An expansion of this section in future volumes would be commendable.

The current volume is otherwise much like its predecessors. It will be useful to those who wish a quick and rather comprehensive survey of new synthetic methods and improvements in old methods in organic chemistry developed within the past several years. The symbolism employed to abbreviate the reaction types is cumbersome and must be reviewed by the average reader each time the book is used unless this is done frequently. The comprehensive, 100 page index is an outstanding feature which adds to the usefulness of this series.

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Biochemistry of Cancer. Second Edition, Revised and Enlarged. By JESSE P. GREENSTEIN, Chief, Laboratory of Biochemistry, National Cancer Institute, National Institutes of Health, United States Public Health Service, Bethesda, Md. Academic Press, Inc., Publishers, 125 East 23 St., New York 10, N. Y. 1954. xiii + 653 pp. 16 X 23.5 cm. Price, \$12.00.

At the present time, when the scientific public is overburdened with a plethora of texts and reference books on all subjects, it is unusual for a single book to occupy a position unique and preëminent in its field. However, "Biochemistry of Cancer" by Greenstein is such a rarity. This is a book that is almost encyclopedic in its coverage of the literature, yet it is written in an interesting and lucid style by one who has a clear grasp of the subject matter and the discernment to present it in terms of a critical evaluation and in perspective. A clear testimony of the author's accuracy and conscientiousness is his statement (p. vii) that he has never referred to an author's work without having the original before him at the moment.

In the seven years that elapsed between the appearance of the first and second editions of this book, research on cancer, particularly from the biochemical approach, has expanded enormously. One important stimulus for this expansion has been the generous financial support afforded by an enlightened public. This situation has been reflected in the book by an increase of from 389 to 653 pages and from 941 to 2209 literature references from the first to the second editions. The book is remarkably up-to-date and free from errors, for which the author and publishers should be commended.

The revised edition follows the same organization as the first, with considerable expansion of all the chapters. The chapter headings are: General Introduction (Chapter 1); General Phenomena and Taxonomy of Cancer (Chapter 2); Extrinsic Factors in Tumor Induction (Chapter 3, chemicals and radiation); Intrinsic Factors in Tumor Induction (Chapter 4, hormones and viruses); Attempts at Control of Tumor Induction and Tumor Growth by Nutrition (Chapter 5), Endocrinology (Chapter 6), and Chemotherapy (Chapter 7); The Chemistry of Tumors (Chapter 8), The Chemistry of the Tumor-Bearing Host (Chapter 9), and the Present Status of the Problem (Chapter 10).

The two most important conclusions emphasized in the discussion of the present status of the problem are that tumors as a class exhibit a rather uniform pattern of metabolism and that tumors produce a characteristic toxin. Although few will disagree with the former conclusion, some might question the generality of the latter, which has been clearly demonstrated only in the case of the reduction of the level

of liver catalase in tumor-bearing animals and which is inferred from the phenomenon of terminal cachexia. Many, including this reviewer, will not agree with the statement (p. 597), "How the normal cell changes in the first instance into the malignant is relatively unimportant, except as obvious means of prophylaxis in industry and in certain social habits may affect this problem."

In a book of this sort there are bound to be some omissions, and these occur primarily in the European literature. The contributions to carcinogenesis of Graffi, Druckrey, Ahlström, Iverson and Norden, if mentioned, would have added additional perspective to a discussion of that area of research. However, these criticisms are minor, and the book is to be enthusiastically recommended to all interested in Oncology, and those of us who are actively working in the field owe Dr. Greenstein a great debt of gratitude for his invaluable compendium and his critical evaluation of the literature on this subject.

MCARDLE MEMORIAL LABORATORY

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Les Applications de la Mécanique Ondulatoire, a L'Etude de la Structure des Molecules. By LOUIS DE BROGLIE, Secrétaire Perpetuel de l'Académie des Sciences, Professeur à la Sorbonne, RAYMOND DAUDEL, Secrétaire Général du Centre de Chimie Théorique de France, Charge du Cours de Mécanique Ondulatoire Appliquée à la Sorbonne, JEAN LECOMTE, Directeur de Recherches au Centre National de la Recherche Scientifique, JEAN WYART, Laboratoire de Minéralogie de la Faculté des Sciences de Paris, ODILON CHALVET ET CLAUDE VROELANT, Membres du Centre de Chimie Théorique de France, PAULINE RAMART-LUCAS, Professeur à la Sorbonne, CAMILLE SANDORFY, Membre du Centre de Chimie Théorique de France, NGUYEN-QUANG TRINH et HENRI LUMBROSO, Laboratoire de Chimie Générale, Sorbonne, ALEXANDRE LAFORGUE, Centre de Chimie Théorique de France, ADOLPHE PACAULT, NICOLE LUMBROSO et JEAN HOARAU, Laboratoire de Chimie Générale, Sorbonne, and PAUL CHANSON, Maître de Conférences à l'École Polytechnique. Revue D'Optique, 165, Rue de Sevres 3 et 5, B^D Pasteur, Paris (XV^e), France. 223 pp. 1953. 1600 francs.

This volume of 220 pages reports eleven lectures given in Paris during the months of April, May and June, 1951, by representative French scientists in the field of molecular structure. The lectures were delivered on five meetings, called "Réunions d'Etudes et de Mises au Point."

The first session (April 24) comprises three papers: an introduction by Louis de Broglie; a short, elementary statement of the meaning of electronic wave functions in atoms and molecules by Raymond Daudel; and a review of the technical advances of infrared spectroscopy over the last ten years by Jean Lecomte. The last paper discusses in particular such topics as infrared detectors, prism and grating spectrometers, and infrared accessories, e.g., reflecting microscopes, rapid scanning methods and polarization of infrared radiation.

On the second meeting (May 8) two papers were given on the problem of interatomic distances in molecules. Jean Wyart surveys the theoretical problems connected with the interpretation of X-ray diffraction and electron diffraction patterns, the determination of interatomic distances in gases and solids, and the determination of crystal structures. Odilon Chalvet and Claude Vroelant discuss quantum mechanical theories which serve to explain the observed interatomic distances in diatomic molecules and in conjugated systems. The molecular-orbital theory is given considerably less attention than the valence-bond approach.

The third session (May 22) deals with electronic spectra of conjugated systems. Camille Sandorfy gives a short but clear representation of the elementary notions generally applied in the explanation of π -electronic spectra. Mrs. Pauline Ramart-Lucas, in a longer article, gives the result of detailed studies of the near-ultraviolet spectra of a number of aromatic rings with attached functional groups; in particular concerning spectral changes due to changes in conjugation caused by steric hindrance, separation by alkyl groups, and cyclization. Cyclization involving various

numbers of methylene groups may reduce steric hindrance increasing conjugation between ring and attached group and thereby increase the wave length of absorption. In molecules with a dipolar ground state cyclization may decrease this polarity and thereby decrease the wave length of absorption. This paper is very interesting and presents an instructive set of spectra.

The fourth session (May 29) is devoted to problems connected with molecular dipole moments. Nguyen-Quang Trinh summarizes the theories of the dielectric polarization and the dielectric constant and the various methods of their experimental determination. He also discusses the attempts to understand the dipole moment of a molecule in terms of its bond moments. Henri Lumbroso considers some problems connected with interpreting electric moments observed in hydrocarbons with polar substituents and in heterocyclic organic molecules on the basis of the resonance concept. Alexandre Laforgue sketches the wave-mechanical problems involved in the calculation of molecular dipole moments; in particular he considers the moment of a diatomic bond and the moment of a system of conjugated π -bonds on the basis of the molecular orbital method.

The final session (June 5) comprises a paper by Adolphe Pacault, Mrs. Nicole Lumbroso and Jean Hoarau concerning their work on the diamagnetic anisotropy of conjugated systems, and a lecture by Paul Chanson on the subject "Can We See Atoms and Molecules Through the Microscope?" The theoretical part of the first article systematizes the molecular diamagnetic susceptibilities by means of a generalized additivity rule (based on "atomic contributions" and "structural increments") and proceeds to discuss the anisotropy caused by delocalized π -electrons and its temperature dependence. Strangely, the theory of F. London is not mentioned. The experimental part of the paper gives a description of the interesting technique recently developed by these authors for the determination of the diamagnetic anisotropy. In the final article Paul Chanson analyzes the nature of the pictures of the microcosmos furnished by X-ray and electron diffraction and discusses the possible resolution of such instruments.

In accordance with the title mentioned above, these meetings had the purpose of bringing the participants up to date on various topics. Consequently, the lectures are mostly brief and do not attempt to be exhaustive; some of them have an extensive bibliography. The book gives a representative review of some of the work of the "French School."

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Catalysis. Volume II. Fundamental Principles (Part 2).
Edited by PAUL H. EMMETT, Gulf Research and Development Company's Multiple Fellowship, Mellon Institute, Pittsburgh, Pennsylvania. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1955. vi + 473 pp. 16 × 23 cm. Price, \$12.00.

This is the second volume to be published on the general topic of Catalysis and again deals, as in the case of Volume I, with fundamental principles. This is true of two chapters by Hulburt on the nature of catalytic surfaces and the nature of complexes on catalytic surfaces; by Eyring and three colleagues on general theories of heterogeneous catalysis; by Wheeler on the problem of pores and pore volume in selective catalytic processes; by King on catalysis in homogeneous reactions in the liquid phase. The introductory chapter by Innes is a classification of the large amount of literature on vapor phase heterogeneous catalysis systematized by the reaction types involved. This chapter summarizes a very considerable body of literature dealing with different reaction types and the catalysts which have been studied.

A study of the chapters dealing with fundamental principles leads the reviewer to the conclusion that it is not yet possible to compile a definitive text on catalysis. All the authors have written lucidly concerning the present state of the science in the area of their immediate concern, even as to the most recent publications in the field. "Much work remains to be done before any conclusion can be drawn" and "Detailed mechanisms for these reactions are still

open to question" are, however, typical of a large volume of comment dispersed throughout these pages. Hence, it is as a provocative series of essays considering the manifold aspects of the problem, *a priori* or induced heterogeneity, *d*-band character of metals and alloys, semi-conductors and catalysis, adsorption, both physical and chemical, on plane surfaces and in pores, the relative importance of physical diffusion or chemical reactivity, that the reader must approach this volume. The student will find in it a veritable mine of research problems. The veteran in the field will conclude that, while much progress has resulted from four decades of work in the modern science of catalysis, there are many areas for the young explorer to discover.

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Introduction to Atomic and Nuclear Physics. Third Edition, Revised and Enlarged, of *Introduction to Atomic Physics*. By HENRY SEMAT, Ph.D., Professor of Physics, The City College, College of the City of New York. Rinehart and Company, Inc., 232 Madison Avenue, New York 16, N. Y. 1954. xii + 561 pp. 16 × 23.5 cm. Price, \$6.50.

In this edition of Semat's widely used book, the text is divided into three parts: 1 (Foundations of atomic and nuclear physics, 202 pages) elements of electricity and magnetism, charged atomic particles, the nuclear atom, electromagnetic radiation, X-rays, waves and particles; 2 (The extra-nuclear structure of the atom, 98 pages) the hydrogen atom, optical spectra and electron distribution, X-ray spectra; 3 (Nuclear physics, 208 pages) natural radioactivity, disintegration of nuclei, nuclear processes, nuclear fission, fundamental particles, new elements and isotopes, and particle accelerators. There are 32 pages of appendices: values of some physical constants, atomic weights of the elements, periodic table of the elements, table of isotopic masses, table of naturally occurring isotopes, path of an α -particle in a Coulomb field of force, derivation of the equations for the Compton effect, evaluation of the integral in quantization of radial momentum in an elliptical orbit.

A reduction in type size has made possible inclusion of about 25% more material in parts 1 and 2 than in previous editions with but a 15% increase in number of pages; part 3 contains roughly four times as much matter as the earlier versions. The chapters in parts 1 and 2 are part descriptive, part analytical in character; those dealing with nuclear physics are almost wholly descriptive.

The book is intended for use at the undergraduate level with students who have had a one-year physics course and a course in the calculus; however, it has been used quite widely in Senior-level courses in atomic physics where the students have somewhat more extensive preparation. The text is well written, and the factual material is very up-to-date. The style is lucid and sustains interest; there are numerous well chosen diagrams and photographs scattered throughout the exposition.

Mechanically, the book meets a very high standard in all respects but one: the reproduction of half-tones is pretty poor on the average.

In this book 30 pages are devoted to an exposition of the wavelike situation, 18 to the Bohr-Sommerfeld treatment of the hydrogen-like atom, and there are 3 pages of broad description given over to the application of wave-mechanics to the same problem. The reviewer believes that this is an unfortunate situation; the student is prepared for dealing with descriptions which involve application of wave-mechanical concepts, then the descriptions or analyses are not permitted to materialize. It seems to me that the distribution of space accorded the hydrogen-like atom in a recent introductory text in physical chemistry is to be preferred; there, five times as many pages were devoted to a description of the wave-mechanical solution of the problem as were spent on the Bohr theory.

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