
 BOOK REVIEWS

Synthesen Organischer Verbindungen. Band I. By Akademiemitglied A. N. NESMEJANOW and PROF. P. A. BOBROW. Akademie der Wissenschaften der UdSSR, Institut für Organische Chemie. VEB Verlag Technik, Berlin, Germany. 1959. 160 pp. 15 × 21 cm. Price, DM 16.—.

This first volume of a projected Russian series in synthetic organic chemistry, now in a German edition, is similar in form and content to its American counterpart. The volume comprises detailed procedures for the preparation of sixty compounds, only seven of which have appeared to date in "Organic Syntheses." For these seven compounds, either different methods or improved yields are described. The individual directions have not been tested by independent workers. However, the editors have "endeavored to include only repeatedly used and consequently reliable methods."

Inclusion of preparations for more than one compound by the same chemical reaction has resulted in considerable repetition. The coupling of a Grignard reagent with an allylic chloride is illustrated by preparations of 1-heptene, 4,4-dimethyl-1-hexene and 3-butyl-1-cyclopentene. Separate preparations for cyclobutane-1,1-dicarboxylic ester and its 3-methyl homolog are described by the malonic ester synthesis. Substituted pyrroles are formed by the condensation of 2,5-hexanedione with both aniline and methylamine. 9,10-Dimethylanthracene and two methylated benzologs are prepared by the action of methyl halide on the corresponding aryllithium compounds. Five compounds including cyclopentane and two homologs are made by catalytic hydrogenation. Direct additions of antimony pentachloride, glycerol and several aliphatic alcohols to acetylene are described. The resulting vinyl ethers are converted to α -halo ethers and α,β -dihalo ethers.

Classical reactions are used for the syntheses of diacyl halides, diamides, dinitriles and related diamines from adipic and sebacic acids. Several compounds such as neoplasmochin, triisobutylene and three bis-(2-dimethylamino-5-pyridyl)-methane derivatives appear to have limited applicability.

Friedel-Crafts alkylation of acetanilide and the use of alkoxymethylpyridine and quinoline salts for the syntheses of alkoxy acetals and alkoxy esters are of special interest.

The syntheses in this volume were contributed mainly by co-workers at the Institute for Organic Chemistry. Future volumes are to have broader scope.

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HARRY D. ZOOK

Synthesis and Organisation in the Bacterial Cell. CIBA Lectures in Microbial Biochemistry. By E. F. GALE. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1959. vii + 110 pp. 13 × 19 cm. Price, \$3.50.

This volume consists of three lectures given at the Rutgers Institute of Microbiology. The first lecture is a comprehensive review of current knowledge of the organization of the bacterial cell, while the remainder of the book, concerned with the synthesis of protein and the nucleic acids, is more restricted in scope than the title might suggest.

The review of bacterial organization presents a clear, succinct, and well-balanced account of an area in which recent progress has been rapid. For many years the interest of biochemists in bacteria has been based to a large extent on the identity of many pathways of intermediary metabolism in all living forms; bacteria have provided especially rewarding material for analyzing the pathways of biosynthesis of the building blocks of protein and nucleic acids. This biochemical unity, however, does not extend to the external envelopes of cells; and the recent preparation of relatively pure bacterial walls has led to the discovery of a number of previously unknown building blocks, unique to bacteria. The formation of the wall from these units has

been found to be the site of action of a number of chemotherapeutic agents, thus explaining the selective toxicity that has made these compounds useful. Dr. Gale shows clearly how such studies on chemotherapeutic action and on macromolecule synthesis in bacteria have mutually reinforced each other.

Having provided a broad background, the author devotes the remainder of the book largely to his own studies. While this procedure is most fitting for a lecture series, the present studies have not yet yielded as clear a pattern as one would like to see in a book. In mammalian cells the roles of amino acid-activating enzymes, soluble RNA, and particulate RNA-protein (ribosomes) in protein synthesis seem quite firmly established. Dr. Gale stresses apparent differences in the mechanism in bacteria, including membranes rather than ribosomes as the principal site of protein synthesis, specific incorporation factors for the various amino acids, and incorporation of amino acids into "amino acid-X." As yet these several substances have not been defined chemically, and their relation to protein synthesis is not clear. And on general principles, one may wonder whether as universal a process as protein synthesis will fail to exhibit the unity that has been demonstrated for amino acid and nucleotide synthesis.

Dr. Gale's provocative findings on protein synthesis are primarily of interest to the specialist in protein synthesis; but the discussion of bacterial organization can be recommended strongly to the more general reader.

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Ionenaustaucher. Band I. Grundlagen. Struktur. Herstellung. Theorie. By F. HELFFERICH. Verlag Chemie, G.m.b.H., Pappelallee 3, Weinheim/Bergstr., Germany. 1959. viii + 520 pp. 17 × 24.5 cm. Price, DM., 48.—.

This treatise on the theory of ion-exchange materials written in German is the most complete and concise compilation in the field. The author has organized his complex subject matter in a very straightforward manner and has managed to condense and consolidate virtually all of our present knowledge of ion-exchange phenomena in twelve chapters. The general topics treated are: (1) structure and mode of action; (2) types of ion-exchangers; (3) manufacture; (4) capacity; (5) equilibrium; (6) kinetics; (7) electrochemical properties; (8) ion-exchange membranes; (9) ion-exchanger loading; (10) behavior in non-aqueous and mixed media; (11) ion exchangers as catalysts; (12) electron-exchange and oxidation-reduction ion exchangers.

The book is completely documented and the discussions are illustrated with 153 diagrams and 14 tables of data. The mathematical treatment is entirely adequate and is easy to follow due to the author's use of a consistent logical set of symbols to represent physical entities.

Anyone interested in ion-exchange phenomena who has acquired a reading knowledge of the German language will find this book of great value.

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Methods of Experimental Physics. Volume 6. Solid State Physics. Part B. Electrical, Magnetic, and Optical Properties. Edited by K. LARK-HOROVITZ and VIVIAN A. JOHNSON, Purdue University, Lafayette, Indiana. Academic Press, Inc., 111 Fifth Avenue, New York 3, N. Y. 1959. xiv + 416 pp. 16 × 23.5 cm. Price, \$11.00.

As one of a series, this volume covers the electrical, magnetic and optical properties of solids. Like the other volumes in the series this is a collection of articles by many independent contributors. For this volume the number

of authors totals 36. Considering this, the uniformity of quality and method of presentation has remained remarkably uniform and good.

Each article surveys for its particular specialty the experimental work which has been done and indicates its importance in the total understanding of solid state physics. The text is fast moving and the information density is very high as the necessary ideas and experimental methods of each subject are presented in order in clear language, with a minimum demand upon the readers' mathematical skills. References to the current literature are generously provided and could form the basis for additional reading.

The book could be used profitably by students of solid state physics quite early in their graduate training. Mature scientists with specialties in the other physical sciences or other branches of physics who wish to review the modern developments in this area should find this volume easy and profitable reading.

General experimental methods are covered. The details of experimental technique (which often make the difference between success and failure in an experiment) are not included. Readers seeking this information should look elsewhere.

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The Proton in Chemistry. The George Fisher Baker Non-Resident Lectureship in Chemistry at Cornell University. By R. P. BELL, Fellow of Balliol College and University Reader in Physical Chemistry, Oxford University. Cornell University Press, 124 Roberts Place, Ithaca, N. Y. 1959. vii + 223 pp. 16 × 24 cm. Price, 4.75.

This book is based on the lectures given by the author at Cornell University as George Fisher Baker Non-Resident Lecturer during 1958. The material covered complements that in "Acid-Base Catalysis" (Oxford, 1941). The author states that "Many of the theses which were argued in some detail in the earlier book now have become generally accepted, and the kinetic evidence obtained from catalyzed reactions has been supplemented by direct studies of acid-base reactions using a variety of modern techniques." An idea of the scope of the book may be obtained from the topics discussed: 1. Qualitative Nature of Acids and Bases. 2. Definition and Measurement of Acid-Base Strengths in Aqueous Solution, 3. Effect of the Solvent on Acid-Base Equilibria, 4. Thermodynamic Functions Relating to Acid-Base Equilibria, 5. Concentrated Solutions of Acids and Bases, 6. Acid-Base Strength and Molecular Structure, 7. Rates of Acid-Base Reactions, 8. Acid Base Catalysis, 9. Rates, Equilibria, and Structures in Acid-Base Reactions, 10. Isotope Effects in Acid-Base Reactions. The writing is lucid, concise, and well documented. The author has wisely omitted the terms "acid" and "base" from the title of this book because these terms are often used in a wider sense without reference to the proton.

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Advances in Chemical Physics. Volume II. Edited by I. PRIGOGINE, University of Brussels, Brussels, Belgium. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1959. ix + 412 pp. 16 × 23.5 cm. Price, \$11.50.

This is the second volume of a series whose expressed aim is to present personalized reviews of various topics, allowing the authors full scope to express their own views on the subjects discussed. It is natural that various writers will use this freedom in different ways; some will address themselves primarily to specialists in their own subjects, others will try to give more or less self-contained accounts which can serve as introductions to workers whose own interests are in other more or less closely related fields. Some of these essays can, indeed, serve the latter purpose, whereas others, either through predisposition on the part of the author or, perhaps, through a feeling of compulsion

toward brevity (even though the introduction states that there was no limitation of space), would seem to be of greater service to the specialist than to the general reader. All of the topics are of timely interest, and they are extremely varied as to content and method.

The volume begins with an article on "Clathrate Solutions," by J. H. Van der Waals and J. C. Platteeuw. This is a particularly interesting class of solutions of gases in crystals for which the usual methods and approximations of statistical mechanics work unusually well. A discussion is given of the theory and the article concludes with a detailed account of numerous experimental data. There follows an account of "Inter- and Intramolecular Forces and Molecular Polarizability," by Kenneth S. Pitzer. This is quite compressed, and the equations are not explained in sufficient detail for the article to serve as an introduction to the subject. It may, however, bring one already acquainted with the field up-to-date, and there are some useful tables. The next paper, by J. S. Rowlinson and M. J. Richardson, is on "The Solubility of Solids in Compressed Gases." It contains a readable introduction to the subject, and a collection of data on a considerable number of systems. (A reference to the point K was omitted in Fig. 1, and the text refers to the curve FO in Fig. 8, as EO, which could cause some momentary confusion.) The fourth article, "Thermodynamics of Metallic Solutions," by R. A. Oriani, brings out some of the difficulties of this theory, and shows that some of the assumptions of the order-disorder theory are invalid. It points to the desirability of further research in this subject. An article, "Recent Advances in Polymer Chemistry," by M. Szwarc, the most "chemical" paper in the collection, gives an account of various aspects of initiation, propagation and termination of polymerization reactions. "Nuclear Quadrupole Resonance in Irradiated Crystals," by Jules Duchesne, describes one of the newer methods of obtaining information on crystal imperfections. By far the most ambitious article in the collection is entitled, "Correlation Problem in Many-Electron Quantum Mechanics," by Per-Olov Löwdin. This deals with the interaction between electrons in atoms and molecules—the many-body problem, with special reference to chemical binding. In spite of the fact that this is the longest article in the volume, it appears to be compressed. Too many of the equations are merely quoted, and too much is taken for granted about the notation for it to be very readable for anyone not already more or less acquainted with the subject. Together with the following article by Hiroyuki Yoshizumi, which is a bibliography of the subject, it serves as a guide to the literature, so that the less experienced reader may find out what he has to learn and where he can find it; for the more experienced reader it will serve as an outline of the present state of the subject. The final article is by E. Bright Wilson, Jr., "The Problem of Barriers to Internal Rotation in Molecules." It discusses both the experimental methods for determining barrier heights, and the various theories concerning them.

Altogether the book offers a useful collection of review articles, which can instruct in many cases, and in any event can offer a guide to the field covered. This series of volumes should be in every chemical library, and in many cases will be valuable in personal libraries. Compared to the "Annual Reviews of Physical Chemistry," we may say that the volumes under review offer, in general, more coherent accounts of more specialized topics. It is probably to be expected that, over the years, "Annual Reviews" will give a more complete coverage of the literature.

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Struktur und Eigenschaften der Materie in Einzeldarstellungen. Band XXII. Elektron- und Ionenprozesse in Ionenkristallen mit Berücksichtigung Photochemischer Prozesse. By Professor DR. OSTAP STASIW, Institut für Kristallphysik Berlin-Adlershof. Springer-Verlag, Heidelberg Platz 3, Berlin-Wilmersdorf, Germany. 1959. viii + 307 pp. 16 × 23.5 cm. Price, DM. 66.—

Although it has a somewhat more comprehensive title, this book covers a less extended field than the now classic work of Mott and Gurney, "Electronic Processes in Ionic