

than twenty-five years, it is highly desirable that more than one such "magnum opus" should be available, preferably with publication schedules appropriately out of phase. The work under review is accordingly a welcome addition to chemical libraries. Out of twenty contemplated volumes this is the fourth to be published; it hoped to complete the series by 1960 though this is perhaps unwarranted optimism. As with Gmelin the obituary crosses in the list of collaborators are silent testimony to the truth of the ancient saying "Ars longa vita brevis." Comparisons with Gmelin are inevitable. "Pascal" will be a good deal shorter than "Gmelin"; if Volume IV is typical, the individual elements will be covered at lengths ranging from three quarters down to one fifth of that of the corresponding treatment in the eighth edition of Gmelin. The format is satisfactory and the typography more pleasing than that of Gmelin; on the other hand the French work seems less richly provided with tables and diagrams.

The distant contemplation of such a formidable accumulation of experimental fact tends to be a trifle depressing but it is impossible to come to close quarters with any section of the book without encountering intriguing observations and many challenges to further investigation. It is probable as a source of references that such works are most useful to the investigator. Here Pascal will be of great value; the deadline for references in each bibliographical section is clearly indicated and for some elements brings the literature survey forward some twenty-five years later than the corresponding Gmelin volume. In such cases the value of Pascal as a complementary guide to the more recent literature is self-evident.

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Phosphorus and its Compounds. Volume I: Chemistry.

By JOHN R. VAN WAZER, Assistant Research Director and Senior Scientist, Inorganic Chemicals Division, Monsanto Chemical Company, St. Louis, Missouri. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1958. xiii + 954 pp. 15.5 × 23.5 cm. Price, \$27.50.

In his Preface, the author says "the purpose of this book is to lay the foundation for a new, separate discipline of chemistry—phosphorus chemistry." However laudable such a purpose may be, the creation of a new discipline that can occupy a position of equality among the classical disciplines of inorganic, organic, analytical and physical chemistry is complicated by the twin problems of ample systematization of fact and principle and of acceptance of the body of information as sufficiently comprehensive and varied to permit continued fruitful study. By presenting phosphorus chemistry as an approach embodying many of the principles of structure and homology that distinguish an orderly organic chemistry from an often much less orderly inorganic chemistry, the author has done much to overcome the first complication. By presenting a massive, but not encyclopedic, array of coordinated information and suggesting innumerable areas for expanding research, he has done even more to overcome the second. Whether he has succeeded in devising a new discipline must be determined by the test of time. However, it cannot be denied that he has produced a volume that will be both an outstanding reference for all workers in phosphorus chemistry and a stimulus to continuing research in this fascinating area.

This volume is concerned primarily with the development of a set of underlying principles for phosphorus chemistry and the implementation of these principles by a thoroughly and carefully documented body of factual information. The emphasis throughout is upon modern interpretation of fundamental chemistry. Technology and related aspects of the chemistry of phosphorus are to be considered in a subsequent companion volume. No attempt has been made to cover every subject with absolute completeness. Rather, the author has attempted to examine available information critically and to include only that which has survived his scrutiny. Although some may question his judgment on specific points, none can disagree that his over-all selection is consistently good and that his coverage is excellent.

Phraseology, clarity of expression and style are considerably above average and render the text both readable and

understandable. The author's boundless enthusiasm for his subject is evident throughout. In large measure, this compensates for certain interpretations with which others may take issue and for occasional overly generous statements such as the "millions of known structures with sp³ bonding" (p. 71). Quite understandably, the author's not inconsiderable contributions to phosphorus chemistry provide the central themes for many of his discussions.

The text is remarkably free from mechanical errors. This and the over-all excellence of printing, binding and presentation attest the carefulness with which the manuscript was handled. Both author and publisher are to be complimented on a job well done.

The book is strongly recommended both to those specifically interested in phosphorus chemistry and to those interested in a significant contribution to the "renaissance in inorganic chemistry." It is unfortunate that the price is so high that many individuals will find it impossible to acquire personal copies.

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TERALD MOELLER

Some Problems in Chemical Kinetics and Reactivity.

Volume I. By N. N. SEMENOV. Translated by MICHEL BOUDART. Princeton University Press, Princeton, New Jersey. 1958. xii + 239 pp. 15 × 23 cm. Price, \$4.50.

This is the second edition of a book which was published first in 1954 in a limited edition of the Academy of Sciences of the U.S.S.R. and was written in preparation for a national symposium on Chemical Kinetics and Reactivity. After the discussions of the symposium, the author was asked to prepare a new edition. This was expanded to include new data from the literature and certain major additions were made to the text of the original. Two English translations, the present one by Boudart and one by Bradley for the Pergamon Press (see review below), have been authorized as well as a German edition.

The present volume is the first of two to be issued by the Princeton Press and comprises the first two of a total of four parts of this work. These two parts cover Radical Reactions (reactions of chain propagation and branching) and Chain Initiation and Termination. The third and fourth parts, on "Kinetics of Chain Reactions" are scheduled to appear in Volume II.

The book was not written as a textbook or treatise, but is a survey, by an outstanding scientist in the field, of developments in the twenty years or more since his first book on "Chain Reactions" was published. It emphasizes radical and radical-chain reactions and there is a frankly personal flavor in the discussion of these. As such, readers interested in chemical kinetics will find it both interesting and rewarding.

The first part of this volume includes an extensive discussion of monoradicals and their reactivity in competitive reactions of addition, decomposition, isomerization, or substitution; the role of polar factors; etc. There is also a much briefer discussion of diradicals. Reactions such as oxidation of hydrocarbons and polymerization are discussed in some detail. In the second part, reactions of chain initiation and termination are discussed on the basis of homogeneous molecular reagents, initiation by ions, and wall effects.

This volume has the minor technical disadvantages which are to be expected in such an edition. It is a paperback edition. There are a fair number of typographical errors, and several instances in which limitations of type have resulted in rather odd notations or in the use of a letter or symbol with more than one meaning in a single equation or paragraph. In a number of instances new materials have simply been appended as footnotes rather than actually incorporated into the text.

The author expresses a note of disappointment that so much of the extensive literature which has appeared is concerned with "disjointed observations on this or that reaction and not with a plan of investigation from all sides." He notes also that it seems to him that the majority of the fundamental problems have not been completely solved as yet. Nonetheless, his book does give a picture which shows much accomplished in building up knowledge of a new group of substances, such as the free radicals represent. The

type of survey of the chemistry of free radicals and the techniques of investigation which he has made here should increase the opportunity for other workers to carry out plans of "investigation from all sides" such as he wishes to see.

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Chemical Transformations by Microorganisms. E. R. Squibb Lectures on Chemistry of Microbial Products at the Institute of Microbiology, Rutgers University. By FRANK H. STODOLA, Northern Utilization Research and Development Division, Agricultural Research Service, U. S. Department of Agriculture, Peoria, Illinois. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1958. ix + 134 pp. 12.5 × 19 cm. Price, \$4.25.

This is the second book in the series of the E. R. Squibb Lectures on Chemistry of Microbial Products. The lectures are delivered annually at the Institute of Microbiology, Rutgers, The State University of New Jersey, by prominent investigators. In three chapters, this little treatise highlights the (1) chemical composition, (2) type reactions and (3) synthetic powers of selected microorganisms. It is pleasingly written and each chapter is headed by quotations relevant to the subjects discussed. To the chemist and microbiologist alike, chapter 2 should be of definite value, for it lists the types of reactions that are brought about by microorganisms: oxidation, reduction, hydrolysis, decarboxylation, deamination, amination, phosphorylation, dehydrogenation, condensation, methylation, dismutation, amidation, esterification, acylation and transglycosylation. The discussion on the formation of α -ketoglutaric acid and L-glutamic acid could have been included here rather than in chapter 3, where the biosyntheses of a few pigments and gibberellins are discussed.

Naturally, in a limited number of lectures such as these, it is impossible to discuss all microbial transformations and important related subjects. Consequently, the biosyntheses of compounds like proteins, vitamins and enzymes were omitted and others such as nucleic acids, antibiotics and cell wall studies, were mentioned only in passing. In spite of this, the book should furnish important references and inspiration for further reading in microbial chemistry.

RESEARCH LABORATORIES
THE UPJOHN COMPANY
KALAMAZOO, MICHIGAN

DUREY H. PETERSON
OLDRICH K. SEBEK

Some Problems of Chemical Kinetics and Reactivity. Volume I. By N. N. SEMENOV, Institute of Chemical Physics, Academy of Sciences of the U.S.S.R. Translated by J. E. S. BRADLEY, B.Sc., Ph.D. Pergamon Press, Inc., 122 East 57th Street, New York 22, N. Y. 1959. x + 305 pp. 15 × 22 cm. Price, \$7.50.

This is one of two English translations of the second edition of the book by Semenov, the other translation having been made by M. Boudart for the Princeton University Press (see above). The first edition was a limited one published in 1954 by the Academy of Sciences of the U.S.S.R.

This volume is a hard-cover edition and is well-bound and well-printed. It is listed as Volume I on the title page, but no indication is given as to what Volume II may be. A Name Index and a brief Subject Index have been provided.

Part I of the present volume, on radical reactions, and Part II, on initiation and termination of reactions, are the

same as in the edition by the Princeton University Press (see review above) except for the addition of a brief but cogent section on heterogeneous catalysis in biology. In addition there is a major section on Kinetics of Chain Reactions, as Part III. This is a general discussion of systems in which chain reactions are competing with reactions of saturated molecules and of the factors which determine their relative rates. Particular attention is given to the initial production of free radicals by decomposition reactions and the production of free radicals by reaction between stable molecules is also discussed. Decomposition of alkyl bromides and chlorides and cracking of hydrocarbons are considered in some detail. There is an Appendix on the activated complex, written by M. I. Temkin, with some interesting comments on the question of "equilibrium" of this complex with the reagent molecules. A second appendix, written by Semenov and N. O. Sokolov, discusses quantum-mechanical calculation of activation energies—with the conclusion that "theoretical calculation of activation energies in quantitative terms for gas-phase bimolecular reactions remains completely impracticable."

As noted in the former review, the book is not a comprehensive textbook or treatise, but it is an interesting and stimulating discussion by an outstanding scientist in the field of the present status of our knowledge of chemical kinetics and chain reactions involving free radicals.

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BOOKS RECEIVED

April 10, 1959—May 10, 1959

PHILIP H. ABELSON, Edited by. "Researches in Geochemistry." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1959. 511 pp. \$11.00.

ERNST BAYER. H. MAYER-KAUPP, Edited by. "Anleitungen für die Chemische Laboratoriumspraxis." Band X. "Gaschromatographie." Springer-Verlag, Heidelberger Platz 3, Berlin-Wilmersdorf, Germany. 1959. 163 pp. DM. 39.60.

WALTER J. HAMER, Edited by. "The Structure of Electrolytic Solutions." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1959. 441 pp. \$18.50.

C. A. JACOBSON, Compiled by. CLIFFORD A. HAMPEL, Edited by. "Encyclopedia of Chemical Reactions." Volume VIII. "Tungsten. Uranium. Vanadium. Ytterbium. Yttrium. Zinc. Zirconium. Addenda." Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1959. 533 pp. \$14.00.

AJIT KUMAR SAHA AND TARA PRASAD DAS. "Theory and Applications of Nuclear Induction." Saha Institute of Nuclear Physics, 92, Upper Circular Road, Calcutta 9, India. 1957. 516 pp. \$6.00.

A. J. C. WILSON, General Editor. N. C. BAENZIGER and C. S. BARRETT (Metals), J. M. BIJVOET and J. WYART (Inorganic Compounds), AND J. MONTEATH ROBERTSON (Organic Compounds), Section Editors. O. EISNER, Assistant Editor. "Structure Reports." Supplementary Volume and Cumulative Index for 1940-1950. Volume 14. N.V. A. Oosthoek's Uitgevers Mij., Domstraat 1-3. Utrecht, The Netherlands. 1959. 215 pp. \$9.50.