

**An Introduction to the Organic Chemistry of High Polymers.**

By CARL S. MARVEL, Research Professor of Organic Chemistry, University of Illinois. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1959. viii + 82 pp. 15.5 × 23.5 cm. Price, \$4.50.

This book is based upon the Humble Lectures in Science delivered by Professor Marvel in June, 1956. It is directed toward the beginner in polymer synthesis, and consequently does not go deeply into any individual problems. It is an introductory survey, and an excellent one, of the organic chemistry of polymers.

The book is well organized, with a most judicious balance among the various topics covered. The style is terse, and completely clear. Throughout, the reader is provided with adequate literature references. By these means, Professor Marvel has succeeded in covering a surprising amount of material in 79 pages of text. The book should be helpful to the advanced student of polymer synthesis as well as the beginner.

POLYMER RESEARCH LABORATORY  
THE DOW CHEMICAL COMPANY  
MIDLAND, MICHIGAN

TURNER ALFREY, JR.

**Organic Reactions. Volume 10.** ROGER ADAMS, Editor-in-Chief. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1959. vii + 563 pp. 16 × 24 cm. Price, \$12.00.

This volume presents a complete discussion of three reactions. The first chapter by Stanley M. Parmerter describes the coupling reaction of diazonium salts with activated carbon-hydrogen bonds in aliphatic compounds. It is limited to those reactions in which the nitrogen atoms of the diazonium salt are retained and no groups are eliminated during the process. The second chapter complements the first by describing the coupling of diazonium salts with activated methinyl groups with the simultaneous elimination of an acyl-, carboxy- or nitro- group (the Japp-Klingemann reaction by Robert R. Phillips). Both chapters describe the scope and application of the processes, give typical experimental procedures and furnish a tabular survey of the reactions.

Most of this Volume 10 is devoted to a very extensive survey (376 pp.) of the Michael reaction written by Ernest D. Bergmann, David Ginsburg and Raphael Pappo. The scope of this chapter is extremely broad, covering all types of anionic adducts to all kinds of acceptor unsaturated systems. The scope of the reaction, reversal, so-called abnormal Michael reactions, intermediates, mechanism, structure of products, experimental conditions and tabular survey are given in a very thorough and complete manner. This chapter really constitutes the best survey of all the ramifications of the Michael reaction.

This Volume 10 is a worthy member of this series and can be recommended to all organic chemists.

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RALPH L. SHRINER

**Progress in Cryogenics. Volume 1.** Editor, K. MENDELSSOHN, D. Phil. (Berlin), M. A. (Oxon.), F. Inst. P., F. R. S. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1959. vii + 259 pp. 16 × 25.5 cm. Price, \$11.00.

It is appropriate that the series of volumes which is to summarize "Progress in Cryogenics" should originate from the Clarendon Laboratory, Oxford, which under the leadership of the late Sir Francis Simon has become one of the foremost low temperature laboratories in the world through the ingenuity of its members in low temperature technique.

The object of this volume and the series to follow it is well stated in the Preface. "Low-temperature technology, which until recently was confined to gas liquefaction and rectification, is rapidly expanding into a variety of completely different fields such as the operation of computers and micro-wave amplifiers. . . . The aim of the present series is to provide summarizing articles on the whole field of low-temperature methods, as distinguished from low-temperature physics or chemistry."

The scope of the present volume (volume 1) is indicated by the table of contents: Preface; Superconducting Cir-

cuits, D. R. Young; Thermoelectric Cooling, D. A. Wright; Evacuated Powder Insulation for Low Temperatures, M. M. Fulk; Distillation at Low Temperatures, B. R. Brown; The Measurement of Mechanical Properties of Metals at Low-Temperatures, H. M. Rosenberg; Frozen Free Radicals, G. J. Minkoff; Low-temperature Calorimetry, R. W. Hill; The Determination of Specific Heats by the Temperature-wave Method, N. V. Zavaritsky; Ultrasonic Attenuation in Metals at Low Temperatures, R. W. Morse.

The articles in general are summarizing in nature. The random order of appearance of the articles on relatively unrelated subjects is somewhat confusing. Useful bibliographies are given at the end of each article, but the lack of any sort of index limits the use of this volume as a reference work. Doubtless as future volumes appear the plan of the series will be clearer and suitable indices will appear.

Because of the high caliber of the individual articles, however, this volume can be recommended even to the casual reader.

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J. G. ASTON

**Introduction to Quantum Field Theory.** By F. MANDEL, M. A., D. Phil., Department of Theoretical Physics, University of Manchester. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1959. vii + 202 pp. 16 × 23.5 cm. Price, \$6.00.

The virtue of this slim volume lies precisely in its brevity, and in its single-minded concentration on the classical diagrammatic approach to quantum field theory inaugurated by Feynman and Dyson. The diagrams summarize an elaborate set of rules for dealing with practical questions, in perturbative expansion. Although they call for the manipulation of infinite quantities in a way which often terrifies the mathematically minded, the rules are well-defined and easily visualizable. What is much less clear is whether the Feynman-Dyson procedures really follow in any kind of rigorous and consistent way from more fundamental versions of the rules of quantum field theory. Indeed, a complete and self-consistent foundation for field theory has not yet been agreed on, which is to say that the subject is still far from being a deductive one. On the practical side, perturbative expansions are rather limited in usefulness, quantum electrodynamics representing, however, a spectacular exception where the first few orders in perturbation theory suffice to yield highly accurate results.

Quantum field theory is presently in a state of flux and has lately taken a very formal and mathematical turn. Nevertheless, it is true to say that even the most esoteric modern practitioners do a lot of their private thinking with Feynman-Dyson diagrams before their eyes and, as in recent developments in dispersion theory, seek support for their conjectures in the low orders of perturbation theory. In short, the covariant, perturbative methods of Feynman and Dyson remain an indispensable source of ideas and visualization for quantum field theory. These methods are expounded more exhaustively in other, more ambitious books, and the present volume contributes no new ideas, physical or pedagogical. However, it gets to the heart of the matter with modesty and speed, and in this it provides a very readable and manageable introduction to its subject. In respect of these things it is in fact one of the best short textbooks available. Unfortunately, its brevity also extends to the matter of practical applications and computational tricks. On the other hand, an extensive set of exercises is provided for the reader, as well as hints to their solution from the author.

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**Formation and Trapping of Free Radicals.** Edited by ARNOLD M. BASS and H. P. BROIDA, National Bureau of Standards, Washington, D. C. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1960. xvi + 522 pp. 16 × 23.5 cm. Price, \$16.00.

The trapping of free radicals in a solid matrix is a rather new field, and a book which brings together many recent