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 TURNER ALFREY, JR.
MIDLAND, MICHIGAN

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.

DEPARTMENT OF CHEMISTRY
UNIVERSITY OF IOWA RALPH L. SHRINER
IOWA CITY, IOWA

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 Circuits, 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.

DEPARTMENT OF CHEMISTRY
THE PENNSYLVANIA STATE UNIVERSITY J. G. ASTON
STATE COLLEGE, PENNA.

Introduction to Quantum Field Theory. By F. MANDL, 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.

PALMER LABORATORY
PRINCETON UNIVERSITY S. B. TREIMAN
PRINCETON, NEW JERSEY

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

data is welcome. The present book is certainly a "mine of information." It is however, a very low-grade mine and the reader will have to shovel away a lot of over-burden to get at the few real nuggets which it contains.

In the first place the word "formation" might well have been left out of the title since the treatment of methods of formation of radicals is very uneven and mainly unsatisfactory, as exemplified by Chapter III on Techniques of Electrical Discharge for Radical Production.

As might be expected the book starts with an attempt to set the new work in its proper perspective in relation to what is already known. Unfortunately the attempt does not come off. The introduction, with its references to the "space age" is extraordinarily inept, and the succeeding chapters give a false impression of what is already known. Certainly our knowledge of free radical reactions has many gaps, but the situation is not as bad as the reader is led to expect in Chapters I and II.

Why Chapter V on Low Temperature Equipment and Techniques is included at all is mystifying. Certainly the reader might have been spared instructions on how to handle Dewar flasks, and a table giving the E.M.F.–temperature relationship for copper–constantan thermocouples.

After this shaky start we come to the real meat of the book in the form of excellent chapters on Radical Formation and Trapping in the Solid Phase by Pimentel, Optical Spectroscopy of Trapped Radicals by Ramsay, E.S.R. Studies of Trapped Radicals by Jen, together with appropriate chapters on Crystals, Polymers and Biological Systems.

Interspersed with the above, and toward the end of the book are a series of chapters having little to do with the subject. It is hard to see the justification, for example, for the chapter on Trapped Radicals in Propulsion, which discusses propulsion in general on the grounds that trapped radicals are not apt to be much use! The most gloriously irrelevant section in the book is Chapter 13, Part 4, Section 5 which reads, in its entirety:

"*5. The Solar Sailboat.* By unfurling giant sails in space, one could use the wind of photons from the sun to tack about the solar system. Calculations indicate that a sail with an area of 20 acres and thinner than the thinnest plastic kitchen wrap would be needed."

We have thus descended to science fiction.

All in all it seems a pity that about half the book was not omitted. The reader would thus have got all that was worth while for $8 instead of $16. This is a very bad book, but because of the amount of information scattered through it and the four or five excellent chapters, the reviewer feels that he must recommend it to those with a major interest in free radicals.

NATIONAL RESEARCH COUNCIL
OTTAWA, CANADA E. W. R. STEACIE

BOOKS RECEIVED

July 10, 1960—August 10, 1960

LEASON H. ADAMS AND ROY M. WAXLER. "Temperature-Induced Stresses in Solids of Elementary Shape." National Bureau of Standards Monograph 2. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. June 21, 1960. 27 pp $0.25.

ADRIEN ALBERT. "Selective Toxicity." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1960. 233 pp. $5.50.

R. D. ANDREWS, Editor. "Transactions of the Society of Rheology." Volume III. 1959. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. 216 pp. $6.75.

PAUL D. BOYER, HENRY LARDY AND KARL MYRBÄCK, Edited by. "The Enzymes." Second Edition—Completely Revised. Volume 3. "Prosthetic Groups and Cofactors (Part B)." Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1960. 497 pp. $16.00.

ALFRED BURGER, Edited by. "Medicinal Chemistry." Second Edition. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. 1243 pp. $37.50.

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE. "Biochimie Comparée des Acides Aminés Basiques. Colloques Internationaux du Centre National de la Recherche Scientifique. Concarneau 1–5 Juillet 1959." XCII. Centre National de la Recherche Scientifique, 15 Quai Anatole France, Paris 7, France. 1960. 436 pp. 45 NF.

S. F. DYKE. "The Chemistry of Natural Products." Volume V. "The Carbohydrates." Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. 232 pp. $4.75.

H J. EMELÉUS AND A. G. SHARPE, Editors. "Advances in Inorganic Chemistry and Radiochemistry." Volume 2. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1960. 392 pp. $12.00.

ANDRÉE GOUDOT. "Que Sais-Je?" No. 874. "La Chimie Électronique et ses Applications Industrielles." Presses Universitaires de France, 108, Boulevard Saint-Germain, Paris 6, France 1960. 128 pp. NF 2.

J. MURRAY LUCK, Editor, FRANK W. ALLEN, Associate Editor, AND GORDON MACKINNEY, Associate Editor. "Annual Review of Biochemistry." Volume 29. Annual Reviews, Inc., Grant Avenue, Palo Alto, California. 1960. 786 pp. $7.00 (U.S.A.); $7.50 (elsewhere).

PAUL PASCAL, Edited by. "Nouveau Traité de Chimie Minérale." Tome XV. "Uranium et Transuraniens." Premier Fascicule. "Uranium." Masson et Cie., 120, Boulevard Saint-Germain, Paris 6, France. 1960. 734 pp. Broché, 115 NF; cartonné toile, 127 NF.

E. H. ERICH PIETSCH, Edited by. "Gmelins Handbuch der Anorganischen Chemie." Achte Völlig Neu Bearbeitete Auflage. "Sauerstoff." Lieferung 4. System-Nummer 3. Verlag Chemie, G.m.b.H., Pappelallee 3, Weinheim/Bergstr., Germany. 1960. 366 pp. Kart. DM. 223. —.

M. SALESSE, Organized by. "3e Colloque de Métallurgie sur la Corrosion (Sèche et Aqueuse). Organisé à Saclay les 29-30 juin et 1er juillet 1959." North-Holland Publishing Company, P. O. Box 103, Amsterdam, Holland. 1960. 241 pp. $10.00.

JOACHIM STAUFF. "Kolloidchemie." Springer-Verlag, Heidelbeger Platz 3, Berlin-Wilmersdort, Germany. 1960. 744 pp. DM. 69.

W. THEILHEIMER. "Synthetic Methods of Organic Chemistry. Yearbook." Volume 14. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. 549 pp. $29.50.

ARTHUR V. TOBOLSKY. "Properties and Structure of Polymers." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1960. 331 pp. $14.50.

A. R. UBBELOHDE AND F. A. LEWIS. "Graphite and its Crystal Compounds." Oxford University Press, 417 Fifth Avenue, New York 16, N. Y. 1960. 217 pp. $5.60.

IA. B. ZELDOVICH AND A. S. KOMPANEETS. "Theory of Detonation." Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1960. 284 pp. $10.00.