

to these classes of materials are discussed and the polymers of industrial importance are treated more thoroughly. A general survey of preparative methods is presented, and in the first chapters the synthetic methods are described in an order determined by the type of elementary reaction which initiates the process. Thus, the writers considered processes based on chain transfer, on radical addition to unsaturation centers which are available in suitable polymers (essentially in rubbers), and the methods which utilize the functional groups either present in the primary polymer or subsequently introduced into it to permit a grafting procedure. Later chapters are ordered according to techniques used in the preparation such as photolysis, radiolysis and mechanical treatment.

A number of interesting examples are found scattered throughout the book, and these add substantially to easy reading. The writers attempt also to provide the reader with the general background which is pertinent to the problems of grafting.

Unfortunately, there are also some shortcomings which need to be mentioned. The general organization of the book suffers from combining a review of synthetic methods with a description of the properties of the resulting polymers. It would be better to separate these two topics and, indeed, this arrangement would be more rational since the same material may be obtained by different routes. The introductory sections leave much to be desired. For example, the theory of addition polymerization, photochemistry or introduction to radiolysis are presented in a sketchy way and not clearly or precisely. Since these subjects are discussed intelligently and thoroughly in many excellent books and texts, it would be better to leave them out and to devote instead more time and space to the main subject of the book, namely, to graft and block polymers. In fact, this main topic of the monograph deserves a more comprehensive treatment. Too many problems were left without any attempt at clarification or possible explanation. There are cases when explanations of the discussed phenomena are known, although the writers apparently were not aware of them. For example, the autocatalytic polymerization of gelled polybutadiene, mentioned as an unexplained feature of the reaction, is probably due to chain rupture caused by the swelling process.

The general impression is that the book was written hastily and the material not too well digested. There are a few errors, for example, some wrong chemical formulas, misspelling of names, etc. It is also strange to notice that the writers were very consistent in removing the second initial of the authors when quoted in the bibliography. In one place the reference is to a Belgian Patent without mentioning even the author's name either in the text or in the reference. It appears that an excellent opportunity for discussing fundamentals of block and graft polymers formation may have been missed.

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Advances in Fluorine Chemistry. Volume I. Edited by M. STACEY, F.R.S., Mason Professor and Head of Department of Chemistry, University of Birmingham, J. C. TATLOW, Ph.D., D.Sc., Professor of Organic Chemistry, University of Birmingham, and A. G. SHARPE, M.A., Ph.D., University Lecturer in Chemistry, Cambridge. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1960. vii + 203 pp. 16 × 25 cm. Price, \$8.00.

Advances in fluorine chemistry have been accelerating for many years and especially since active work in this area began as a part of the Manhattan District program for the development of the atomic bomb. There is no doubt that the latter program was the main stimulus to active academic as well as industrial research in this important field. The advances have been made in most all areas, including organic, inorganic and industrial chemistry, with other areas such as biological chemistry enjoying their fair share. The authors of the book on "Advances in Fluorine Chemistry" admit that in spite of desperate efforts to write a textbook of fluorine chemistry with special reference to organic fluorine compounds, the task has been beyond them because of the output of original contribution. In a field

growing as rapidly as fluorine chemistry, it is inconceivable that a book covering the recent advances can be realized.

The present book covering five chapters appears to have no particular theme except that of perhaps the primary interests of the authors involved. However, a great deal of material is included in these areas. Substantially all of the material in the five chapters is specifically over inorganic materials with special reference to use in the synthesis of fluorine-containing organic compounds.

The chapter on Halogen Fluorides by Musgrave is a good review of the literature on the preparation of halogen fluorides, including representative examples of attempts to make use of these materials as fluorinating agents. In spite of the fact that many investigators have attempted to make use of the halogen fluorides as fluorinating agents, few if any of the results stand out as particularly significant in the preparation of organic fluorine compounds. The author fails to devote much space to a discussion of the shortcomings of the halogen fluorides as reagents for preparative or industrial use. Bromine trifluoride, as pointed out, has been available commercially but little discussion seems to be given of the use made of the commercial material. Likewise, the potential for chlorine trifluoride seems to be overlooked.

Transition Metal Fluorides and Their Complexes is exceedingly well covered by the author, Sharpe. A great deal of work has been done with transition metal fluorides, especially their preparation and their properties. These metal fluorides, as would be expected from many complex fluorides, have been actively investigated. Unlike three of the chapters, this portion of the book has little or no significance in the preparation of organic fluorine compounds.

Fluoroboric Acids and Their Derivatives have been extensively investigated for many years. Bromine trifluoride, an important compound in the formation of the fluoroborates, has been an important reagent to both organic and inorganic chemists for many years, primarily because of its ability to complex with many other substances and its interest in catalysis. The author discusses in considerable detail the tetrafluoroborate ion, including an extensive review of tetrafluoroboric acid. Tetrafluoroborates have been of considerable interest and the review seems to be rather complete. Subsequent to the discussion on the tetrafluoroborate ion, the author discusses the tetrafluoroborates by groups, *i.e.*, groups 2A, 3A, etc. Anyone interested in tetrafluoroborates would find this chapter invaluable.

The Electrochemical Process for the Synthesis of Fluoro-organic Compounds has been reviewed on several occasions. The authors Burdon and Tatlow again give a comprehensive review of the process, discussing not only the apparatus used but also the operating conditions. It is pointed out that the process has limitations. For example, one of the limiting factors in the fluorination of hydrocarbons is the low solubility of these substances in hydrogen fluoride. In addition, the resulting solutions are non-conducting. There are means of partially overcoming these difficulties with the hydrocarbons and their halogenated derivatives. Ethers are reported to be fluorinated readily and in high yields by the electrochemical method. This has been an area of considerable industrial interest. Other types of organic compounds such as amines, carboxylic acids and sulfur compounds are discussed. Many of these materials do not survive the electrochemical fluorination process without substantial change, usually fission of the basic structure. The authors make an attempt to interpret the mechanism for the process, but it seems at best only postulated mechanisms are feasible at this time. The authors point out that the process yields and ratios of products often vary except in a limited number of classes of compounds. Very little attention is given in the chapter to the present commercial status of the process and its potential.

Exhaustive Fluorination of Organic Compounds with High Valency Metallic Fluorides has been studied extensively as reported by Stacey and Tatlow. A variety of organic compounds has been fluorinated, especially with cobaltic fluoride and silver difluoride. Other reagents such as manganese trifluoride, cerium tetrafluoride, and lead tetrafluoride have been of more limited interest and utility. Silver difluoride and cobaltic fluoride are most applicable for the synthesis of highly fluorinated compounds and in particular perfluoro compounds, *i.e.*, those in which all carbon-hydrogen bonds have been replaced by carbon-fluorine bonds. Since high temperatures are required, it is not sur-

prising that this procedure is most satisfactory with hydrocarbons and their halogenated derivatives. Most organic compounds undergo extensive degradation under the conditions required for reaction. The authors not only describe conditions and apparatus for the process but also discuss the possible reaction mechanisms.

Those interested in the particular subject matter in one or more of the five chapters as discussed herein would find the book both interesting and valuable. It is recommended for reference purposes to all those interested in fluorine compounds.

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Lipide Metabolism. Edited by KONRAD BLOCH, Department of Chemistry, Harvard University. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1960. xiii + 411 pp. 15.5 × 23.5 cm. Price, \$10.50.

This book covers some major aspects of lipid metabolism but as the Editor himself states, in order to expedite publication it was necessary to sacrifice complete coverage of the field. Indeed, the breadth of lipid metabolism is of such a large dimension that it is unlikely that any single text can today deal with all the subject material without becoming unwieldy in size. It is therefore customary to strike a compromise which represents on the one hand a fairly complete coverage of certain selected subjects or on the other hand a brief treatise of all the major subjects in the field. This book conforms to the former.

The content of this book is embodied in eight chapters. In Chapter 1, D. E. Green and S. J. Wakil discuss the enzymatic mechanisms for the synthesis and oxidation of fatty acids. Acetoacetate formation and fatty acid desaturation are covered only briefly. The biosynthesis of fatty acids by mitochondrial, non-mitochondrial and bacterial systems are included. Chapter 2 deals with the metabolism of unsaturated fatty acids. J. F. Mead handles this chapter in a fairly concise manner and presents the biosynthesis, hydrogenation and interconversions of these lipids. The next chapter is contributed by R. J. Rossiter and K. P. Strickland and covers the metabolism and function of the phosphatides. This article summarizes the current knowledge concerning the biosynthesis of the individual phosphatides and discusses the proposed multiple functions of these compounds in a very interesting fashion. Chapter 4 is concerned with the metabolism of the glycerides. B. Borgstrom is the author of this article which summarizes the recent advances in the digestion, absorption, and transport of the glycerides and the metabolism of the non-esterified fatty acids. One can appreciate the difficulty in writing a review article on this subject in view of the large number of papers in this field. In Chapter 5, M. Kates gives a fairly complete coverage of the lipases, phosphatidases and other lipolytic enzymes. This review is thoroughly done and well presented. It should be pointed out that new evidence has since come forth from three independent laboratories which firmly establish the specificity of phospholipase A as being a preferential cleavage of the β -linked fatty acid. This cleavage is position dependent and appears not to be related to chain length or degree of unsaturation of the fatty acid. However, the specificity may not be absolute since there is evidence that with some of the natural lecithins the α -linked fatty acid may be cleaved to a small degree (a few per cent.). Chapter 6 covers the hormonal regulation of fatty acid metabolism. In this review R. G. Langdon summarizes recent work on the effect of insulin, epinephrine and anterior pituitary hormones on fatty acid metabolism. Ketosis and fatty acid transport also are dealt with. Chapter 7 of the book is contributed by S. Bergstrom, H. Danielsson and B. Samuelsson and presents the current knowledge on the formation and metabolism of the bile acids. The conversion of cholesterol to bile acids and the quantitative aspects of bile acid metabolism in man and animals are well covered. A smaller section on the metabolism of the conjugated bile acids is also included. The last chapter of the book presents a much needed and timely article on the chemistry, metabolism and biological activity of bacterial lipids. F. Asselineau and E. Lederer cover this field quite adequately and undoubtedly this area of lipid chemistry and metabolism will surge forward in the coming years.

It is apparent that each chapter in the book has been written by a person or persons who are experienced and eminently qualified to review their respective fields of work. The book therefore is highly informative and specialized and will be a particularly useful reference textbook, especially in view of the fact that each chapter has an extensive bibliography. The beginner in the lipid field may not find this book appealing because of the style and specialization. However, nearly every chapter contains a brief historical introduction which will help the less informed readers.

Most text books on lipid metabolism have not in this reviewer's opinion taken up the difficult challenge of integrating this massive field and moreover have not included provocative and speculative articles on those areas which are fundamentally important but poorly understood. Questions relating to the absorption and transport of lipoproteins and non-esterified fatty acids must at some time be considered at a molecular level. This will require a more precise knowledge of the structure of lipoproteins and cell membranes. Only then will the postulated functions of lipids in such vital biological processes as cell permeability, ion transport, specific growth factors, and nerve transmission (and brain function) be better understood. It may be too premature to include detailed articles on these subjects at the present time, but the need for such articles is ever increasing.

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Neutron Detection. By W. D. ALLEN, B.Sc., D. Phil., Atomic Energy Research Establishment, Harwell, England. Philosophical Library, Inc., 15 East 40th Street, New York 16, N. Y. 1960. vii + 260 pp. 14.5 × 22 cm. Price, \$10.00.

Instrumentation for the detection and spectroscopy of neutrons is a subject of considerable significance to those engaged in widely diversified areas ranging from analytical chemistry to reactor technology, from oil-well logging to nuclear spectroscopy. The considerable effort which has been directed to developing neutron detectors over a period of more than two decades has resulted in a large number of instrumental methods which are available to one who is embarking on a program which in some way involves neutrons. The experimenter who is not a specialist in neutron counting may very reasonably be faced with a difficult problem in deciding what neutron detection method, or what particular counter, is best suited to his needs, *e.g.*, whether to use neutron activation techniques, nuclear emulsions, a BF_3 counter, a boron-loaded scintillator, or other means. It is to such a reader that this book is particularly addressed. It is assumed that the reader has a basic knowledge of nuclear physics and the elementary principles of particle detection.

The first principal section of the book discusses the general features of reactions used in neutron detection, including (n,p) scattering, the $\text{B}^{10}(\text{n},\alpha)\text{Li}^7$ reaction, other exothermic reactions as $\text{He}^3(\text{n},\text{p})\text{T}$ and $\text{Li}^6(\text{n},\alpha)\text{T}$, fission, radiative capture reactions, the Szilard-Chalmers process and threshold reactions. The next section treats the chief instruments of neutron detection and includes a discussion of ionization chambers (with attention to boron-lined counters and fission chambers), proportional counters (particularly the BF_3 counter), organic and inorganic scintillation detectors, and nuclear emulsions. The final chapters are concerned with practical aspects of fast- and slow-neutron flux measurements, methods of neutron spectroscopy, neutron sources, and neutron standards. The treatments of the individual topics given in this book are by no means exhaustive, as each one might easily be the subject of a separate volume. The author has succeeded, however, in discussing the essential features of the various subjects in a coherent and informative manner. Numerous examples of particular counters or methods serve to illustrate the general principles. Frequent discussions of a detailed nature are given on counter construction and use. For example, attention is given to the mechanical aspects of fabrication of a BF_3 counter and the need for careful purification of the counting gas.

A very good bibliography provides access to more detailed treatments in the literature. The bibliography ap-