

extremely good purification. The editors also provide a glimpse into the future of dry-chemical and pyrometallurgical techniques as applied to reprocessing and also give the reader a brief, but extremely effective, history of the early Bismuth Phosphate process which was the first separations method to be applied on a plant scale for the recovery of plutonium.

Those who give the volume the attention it deserves will find that they must mentally "shift gears" as they progress through the chapters, since the scope of detail and methods of discussion and presentation naturally reflect the dissimilar individual characteristics of the authors. Nevertheless, the work is a significant contribution in that it represents a first step of a much larger job of systematically organizing and presenting in textbook or handbook form much of the excellent and extensive information that now can be made available in the area of chemical reprocessing of nuclear materials.

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R. B. RICHARDS

**Comprehensive Inorganic Chemistry.** Volume Five. M. CANNON SNEED, Professor Emeritus of Chemistry, School of Chemistry, University of Minnesota, and ROBERT C. BRASTED, Associate Professor of Chemistry, School of Chemistry, University of Minnesota, Editors. **Nitrogen, Phosphorus, Arsenic, Antimony, and Bismuth.** BY HARRY H. SISLER. **Nonaqueous Chemistry.** BY ALFRED R. PRAY. D. Van Nostrand Company, Inc., 120 Alexander Street, Princeton, New Jersey. 1956. x + 214 pp. 16 × 23.5 cm. Price, \$5.00.

According to the editors, "Comprehensive Inorganic Chemistry is an eleven-volume reference work on the chemical elements and their inorganic compounds. It is comprehensive in the extensiveness of the fields covered rather than in the fullness of their treatment. . . . Their purpose is to serve as a ready reference to those engaged in chemical manufacture and development and to those in advanced studies in chemistry in institutions of higher learning. To meet the requirements of these groups, emphasis is placed largely on chemical properties and relationships and their interpretation in terms of theoretical concepts of atomic and molecular structure, the deductions from the periodic system, and the basic ideas relating to electrolytes."

These general objectives are realized successfully in Volume V. The treatment is more advanced than that characteristic of a good text at the general chemistry level, and yet it is not encyclopedic. It will serve well for a rapid survey of the areas that are discussed, and the references cited will guide readers to more intensive reading in the original literature. The discussion is well organized, clearly presented, and bears the mark of careful editing. Only a moderate number of minor errors are apparent.

Part I is introduced by a summary of the general characteristics of the elements of the nitrogen family, including a catalog of their isotopes. Chapter 1 consists of 94 pages covering the chemistry of nitrogen and its compounds. An adequate discussion of the element is followed by a good summary of the hydronitrogens which emphasizes the ammonia acid-base system. The author then describes the oxides, oxyacids, halides and sulfides of nitrogen. Regrettably, there is no discussion of the important topic of cyanogen and the inorganic cyanides, a subject which seems to be regarded by many writers of inorganic works to be outside the field. Although some 173 footnotes deal with literature references, a more thorough documentation would have made the treatment more valuable to those who will want to do more intensive reading.

The 46 pages of Chapter 2 survey the chemistry of phosphorus, arsenic, antimony and bismuth, with emphasis on phosphorus compounds. This chapter presents the main characteristics of this family of elements, but here again one wishes that the 45 footnotes concerned with references had been greatly augmented to encourage further reading.

Under the heading "Nonaqueous Chemistry," Part II affords 48 pages in which a general discussion of non-aqueous solvents and solutions is followed by a rather extensive survey of ammonia as a solvent and of typical reactions in liquid ammonia. Finally, the very limited available knowledge of solutions in acetic acid, hydrogen cyanide, sulfur dioxide, phosgene and selenium oxychloride is re-

viewed. This material is well chosen to follow the general discussion of nitrogen chemistry in Part I and should stimulate readers to investigate further the interesting possibilities of non-aqueous solutions. The extensive documentation provided by 193 footnotes will make it easy to consult the original literature. A serious omission is the lack of tabulations of the physical properties of phosgene and selenium oxychloride. These would have given the reader a better idea of the solvent possibilities of these less familiar liquids. Also some discussion of the structures of all of the solvents described would have made their behavior more understandable.

This volume is a welcome addition to the literature of inorganic chemistry, where good survey treatments have been sadly lacking.

CORNELL UNIVERSITY  
ITHACA, N. Y.

A. W. LAUBENGAYER

**The Chemical Constitution of Natural Fats.** Third Edition Revised. By T. P. HILDITCH, C.B.E., D.Sc. (Lond.), F.R.I.C., F.R.S., Professor Emeritus in the University of Liverpool. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1956. xix + 664 pp. 16.5 × 24.5 cm. Price, \$16.00.

"This book, which first appeared in 1940, was revised in its second edition, published in 1947, which included the results of subsequent investigations on fats up to about 1945. Since then, much has been added in several notable respects to our knowledge of natural fats and their components, and it has been necessary, in preparing a further edition, to make extensive alterations to the book as originally published in 1940. Its general plan, however, has been left unaltered." Thus the author describes his undertaking in the preface to his third edition.

The general plan followed throughout the various editions of the book has been to approach the study of natural fats from the standpoints of (a) the component fatty acids, and (b) the component glycerides. Following the introductory chapter, are three chapters devoted to fatty acid composition. These chapters take up in order the fats from aquatic flora and fauna, fats of land animals, and vegetable fats. The next three chapters deal with the component glycerides. A discussion of methodology and interpretation of results is followed by a rather detailed survey of the glyceride compositions of individual vegetable and animal fats. The author notes in his preface that these three chapters have been entirely rewritten because of recent advances. A glance at the lists of references reveals that a large part of the work is from the laboratories of the author and his associates. The last four chapters are concerned, respectively, with possible mechanisms of biosynthesis of fats; structures of individual fatty acids; synthetic glycerides, naturally occurring higher alcohols, and acyl ethers of glycerol; and analytical techniques.

For those with a purely academic interest in fats, the book develops the thesis that related flora and fauna have fats of similar composition. There is a definite trend toward simplification in the fats of both plants and animals as the evolutionary scale is ascended. The distribution of fatty acids among the various glyceride molecules tends to be "even" rather than "random," although there are exceptions.

Persons actively engaged in research in the field of fat composition will be interested in the large amount of information that has been assembled. This volume is 20% larger than the previous edition. Documentation is thorough; several thousand literature references are cited. An author index would have been helpful, but the subject indices will usually suffice to locate a particular reference.

A weakness of the book is that only the three chapters on glyceride composition were completely rewritten. Some of the other sections suffer because new material was added to the essentially unchanged original text, and obsolete or erroneous information was not always deleted. For example, one notes on page 563 that over 20% of the alcohols of wool wax belong to aliphatic series that contain both even and odd numbers of carbon atoms. Contradictory statements retained from the previous edition occur on page 487. "The wax aliphatic alcohols. . . are confined to members which contain an even number of carbon atoms in the molecule," and on page 489, "Wool wax. . . consists of

ester waxes in which the alcohols are a mixture of sterols." Fortunately, such contradictions are not numerous.

Another weakness is an apparent reluctance of the author to give sufficient emphasis to new ideas and methods. Thus, more space is devoted to disproving the existence of odd-numbered fatty acids than to reporting the proof of their isolation and identification. In the analytical section, the new and powerful gas-liquid chromatographic technique is disposed of in a sentence, but the obsolete lead-soap separation is detailed in two full pages. The section on vacuum fractional distillation is badly in need of modernization. Space devoted to the time-honored Willstätter flask might better be used to show the kind of equipment used in a modern laboratory. Enough use has been made of molecular distillation to warrant some mention of it.

The book is excellently printed in clear, legible type and is exceptionally free of typographical errors. The quality of paper and binding are noticeably improved over the previous edition. Perhaps the best recommendation for the book is its wealth of information and the comprehensive key to the literature that it provides. Accordingly, it will serve as a useful addition to chemical reference libraries; for those more specifically concerned with fats, it is a worthwhile replacement for the previous edition. Professor Hilditch is to be commended for this contribution to the literature of natural fats.

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A. W. WEITKAMP

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### BOOKS RECEIVED

February 10, 1957—March 10, 1957

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SIDNEY P. COLOWICK AND NATHAN O. KAPLAN, edited by. "Methods in Enzymology." Volume III. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1957. 1154 pp. \$26.00.

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