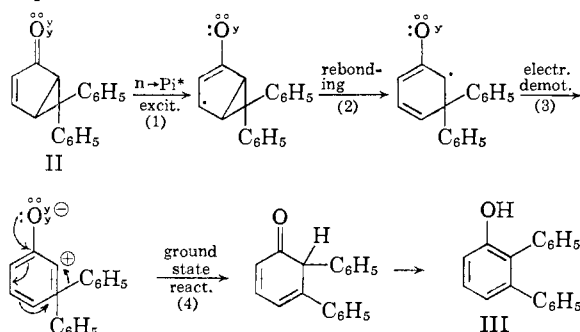


(3) electron demotion, and (4) transformations having ground state parallel.

The II to III rearrangement again involves four steps



Significantly, this treatment reasonably accounts for the involvement of electron deficient Pi systems in  $n \rightarrow \pi^*$  photochemical transformations. These mechanisms are applicable to the santonin to lumisantonin and related rearrangements, even accommodating the known<sup>11</sup> reaction stereochemistry. Furthermore, the general approach is applicable to a large number of other photochemical reactions. These points will be considered in detail in our full paper on the present subject and in related papers.

DEPARTMENT OF CHEMISTRY  
UNIVERSITY OF WISCONSIN  
MADISON 6, WISCONSIN

HOWARD E. ZIMMERMAN  
DAVID I. SCHUSTER

RECEIVED SEPTEMBER 5, 1961

(11) D. H. R. Barton and P. T. Gillam, *J. Chem. Soc.*, 4596 (1960); *cf. ref. 2 also.*

## BOOK REVIEWS

**Chemical Aspects of the Structure of Small Peptides. An Introduction.** By DOROTHY WRINCH, M. A. Cantab, D. Sc. Oxon., D.Sc. Lond., Visiting Research Professor at Smith College, Massachusetts, USA. Enjar Munks-gaard, Ltd., 6 Nørregade, Copenhagen, Denmark. 1960. 194 pp. 18 × 25.5 cm. Price, Dan. kroner 24.—.

Dating from the earliest structural studies, there has been speculation regarding the existence of tetrahedral "orthoamide" bonds in proteins. Half a century has passed, however, and the question remains essentially unanswered. In large measure, demonstration of such bonding by chemical means is hindered by the extreme complexity of the molecule in question as well as by the existence of an "uncertainty principle": namely, that a protein cannot be readily submitted to chemical examination without some modification of its intimate structure. Detection by physical means of a small number of tetrahedral linkages in the presence of a preponderance of trigonal peptide bonds is, again, a problem of enormous proportions. In 1936, Dr. Wrinch proposed a "cyclol" theory in which amide bonds were abandoned and a totally tetrahedral structure for proteins was advanced. In more recent times, a small amount of chemical evidence has appeared which demonstrates the ability of amides to form relatively stable tetrahedral or "ortho" linkages. However, the evidence is based on circumstances which are highly specialized and geometrically favorable. Dr. Wrinch has now brought forth a Monograph in which she reviews the limited chemical data and proceeds to reapply the "cyclol" concept to small peptides. What might have been presented simply and concisely in a dozen pages has been expanded to almost two hundred by the use of a maze of symbolism and grandiloquence. The promise that "this Monograph reports results obtained in an enquiry into chemical aspects of the structure of small peptides" is not fulfilled, since no original experimental work, chemical or otherwise, is reported. On the basis of three or four reported cases of "orthoamide" linkages, Dr. Wrinch asks for "the repudiation of the amide hypothesis" for small peptides. In the face of overwhelming evidence from spectral data alone, such a request cannot merit serious consideration. Certainly, the majority of students of peptide and protein structure are aware that their best efforts, to date, have led only to primary sequences and that considerable effort will have to be expended to elucidate more intimate structural details, among which there may be found a small number of covalent linkages of the "ortho" peptide variety. This is an area in which conservatism can be displaced only by very convincing experimental data. Because of the extreme views pre-

sented, based on such meager evidence, and because of the unnecessarily lengthy text, this reviewer cannot recommend Dr. Wrinch's Monograph as a major contribution to the literature of protein chemistry.

NATL. INST. OF ARTHRITIS AND METABOLIC DISEASES  
NATIONAL INSTITUTES OF HEALTH  
BETHESDA 14, MARYLAND

LOUIS A. COHEN

**Gas Chromatography. Second International Symposium Held under the Auspices of the Analysis Instrumentation Division of the Instrument Society of America, June, 1959.** Edited by HENRY J. NOEBELS, Beckman Instruments, Inc., Fullerton, Calif., R. F. WALL, Monsanto Chemical Co., Texas City, Tex., and NATHANIEL BRENNER, The Perkin-Elmer Corp., Norwalk, Conn. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1961. xvi + 463 pp. 16 × 23.5 cm. Price, \$16.00.

A graph is presented on page 375 of the volume under review on which are plotted the number of articles in the literature dealing with gas chromatography in each year from 1952 to 1959. This number has risen from a few articles in 1952 to nearly 800 in 1959; moreover the slope appears still to be rising and must be almost infinite by now. In such a situation it is almost impossible for the average chemist, who wishes to use gas chromatographic techniques as a routine tool, to keep up with the more recent developments in the field. Publication in book form of groups of papers presented at periodically scheduled symposia offers the reader an opportunity to become familiar with some of these developments in a manner which is economical of his time.

As with all collections of this nature, the quality of presentation is somewhat uneven, the topics discussed are necessarily limited, and the choice of those topics is unlikely to meet with approval, or the needs, of every reader. Nevertheless, there is much useful information in this book and it should be available to all who have any interest whatsoever in gas chromatography and its application.

The present volume contains a large selection of specific applications, several articles on detectors (including methods of expressing sensitivity) and recording systems, one on some theoretical considerations of large diameter chromatographic columns, one showing experimental relations between sample size and carrier flow rate and HETP, and, gratifyingly, two devoted to detailed consideration of the role of the solid supporting material in a column. There is

also a delightful first hand account, by A. T. James, of the growing pains of early gas chromatography apparatus. This reviewer found several ideas in this book which he plans to adapt in some of his own applications; he feels certain that even a superficial reading will yield a similar benefit to most readers. He was impressed by the array of data on relative retention times obtained for a variety of substances on each of several standard columns available for one commercial instrument. He deplores, however, the type of paper submitted for a few of the apparatus manufacturers. It would appear that one or two of these articles had been prepared for the mystification or astonishment of the reader rather than as contributions to scientific or technological knowledge.

The final bibliography, continuing the 442 entries compiled in the first volume of this series, now extends to 1975 entries. While apparently exhaustive, the reviewer feels that the bibliography would be more useful if the classification had been left in the chronological form in which it certainly was first obtained. The present arrangement, alphabetical by the first author's surname, would appear to be the least useful format.

N. R. C. No. 6475  
DIVISION OF PURE CHEMISTRY  
NATIONAL RESEARCH COUNCIL  
OTTAWA, CANADA

K. O. KUTSCHKE

**Gmelins Handbuch der Anorganischen Chemie, Achte Völlig Neu Bearbeitete Auflage. Quecksilber. Lieferung. Geschichtliches. Vorkommen. Darstellung. Physikalische Eigenschaften des Elements. System-Nummer 34.** Edited by Gmelin-Institut. Begonnen von R. J. MEYER. Fortgeführt von E. H. ERICH PIETSCH. Stellvertretender Hauptredakteur, Alfons Kotowski. Verlag Chemie, G.m.b.H., Pappelallee 3, Weinheim/Bergstr., Germany. 1960. xvii + 466 pp. Price, \$67.50.

This work deals with the history, occurrence, preparation and the physical properties of the element mercury with very little pertaining to its compounds. The historical section of this volume has some 80 pages. This part is quite complete and should be of decided value to the student of the history of chemistry.

The occurrence of mercury, both free and in its ores and minerals, is thoroughly discussed. A survey of countries and regions where mercury occurs is listed with a geological inventory on this metal.

The part dealing with the physical properties of the element is most complete. Many pages are given over to the thermodynamic properties of the metal in all of its states. Some 27 pages contain a complete and thorough expose on the subject of colloidal mercury. I am sure no other inorganic references volume has such a unique discussion of this phase of the metal.

This volume should be welcomed to the family of Gmelins Handbuecher.

DEPARTMENT OF CHEMISTRY  
INDIANA UNIVERSITY  
BLOOMINGTON, INDIANA

FREDERIC C. SCHMIDT

**Gmelins Handbuch der Anorganischen Chemie, Achte Völlig Neu Bearbeitete Auflage. Lithium. Ergänzungsband. System-Nummer 20.** Edited by Gmelin-Institut. Begonnen von R. J. MEYER. Fortgeführt von E. H. ERICH PIETSCH. Stellvertretender Hauptredakteur, Alfons Kotowski. Verlag Chemie, G.m.b.H., Pappelallee 3, Weinheim/Bergstr., Germany. 1960. xxviii + 525 pp. 17.5 × 25 cm. Price, \$77.50: Cloth bound, \$78.50.

This is a supplementary volume to that which appeared in 1928, and it is much more complete and inclusive than the original.

The geochemical references of the element lithium take up some 142 pages which include both terrestrial and extra-terrestrial studies. Economic deposits of lithium ores of practically every region of our globe are specifically listed. Analytical data are given regarding the extent of the lithium deposits.

Physical chemical data on both the element and its compounds are about as complete as could be. Both liquid and

solid state of the element are discussed. Even mechanical properties, such as Young's modulus and compressibility of the solid, are given. This seems to be unique for such a book.

The properties, both physical and chemical, of the salts of this element are extended over the original volume.

It is encouraging to note that many data have been included regarding non-aqueous solutions of the salts of lithium, particularly conductance and thermochemical data.

This supplementary volume is most valuable and is done with the usual and expected German thoroughness.

DEPARTMENT OF CHEMISTRY  
INDIANA UNIVERSITY  
BLOOMINGTON, INDIANA

FREDERIC C. SCHMIDT

**Gmelins Handbuch der Anorganischen Chemie, Achte Völlig Neu Bearbeitete Auflage. Schwefel. Teil b. Lieferung 2. System-Nummer 9.** Edited by Gmelin-Institut. Begonnen von R. J. MEYER. Fortgeführt von E. H. ERICH PIETSCH. Stellvertretender Hauptredakteur, Alfons Kotowski. Verlag Chemie, G.m.b.H., Pappelallee 3, Weinheim/Bergstr., Germany. 1960. xxxviii + 758 pp. 17.5 × 25 cm. Price, \$111.00: Cloth bound, \$112.00.

This volume constitutes the second half of Part B on the subject of the element sulfur. Here the oxides and particularly the oxyacids of sulfur are described both from the standpoint of physical properties and their chemical behavior; 183 pages alone are given over to the properties of sulfuric acid. The survey is most complete.

Oxyacids of sulfur of both lower and higher oxygen content than sulfuric acid are considered. The physical properties and chemistry of some 18 oxy and thio acids of the element are listed. Besides these acids several pages are given over to the polythionic acids. Complete and well chosen analytical determinations for the ions of the simple and more complex acids are given in detail.

This book has many good two-component phase diagrams of water plus the oxides of sulfur as well as those involving the acids themselves. This volume contains all that is known about the oxygen compounds of sulfur. I doubt that any information has been neglected. It is the "One Thousand and One Tale" on this subject.

As is usual with a Gmelin Handbuch, the literature references are complete.

DEPARTMENT OF CHEMISTRY  
INDIANA UNIVERSITY  
BLOOMINGTON, INDIANA

FREDERIC C. SCHMIDT

**International Series of Monographs on Inorganic Chemistry. Volume 3. An Introduction to Co-ordination Chemistry.** By D. P. GRADDON, M.Sc., Ph.D., F.R.I.C., Senior Lecturer in Inorganic Chemistry in the University of New South Wales. Pergamon Press Inc., 122 East 55th Street, New York 22, N. Y. 1961. vii + 111 pp. 15 × 23 md. Price, \$4.00.

During the past decade, a considerable number of books on coördination chemistry has appeared. These have been of great variety, ranging from small to large, and from broadly general to highly specific. There have been books for the general reader, textbooks, reference books, and collections of symposium papers. All of them have been well received and have won wide readership. As Dr. Graddon points out in the preface to his book, this great interest in coördination chemistry indicates "that the process of coördination, far from being an academic sideline, is one of the dominant factors determining the chemistry of the elements."

This little book is extremely well written, and should be useful, not only to students (for whom it is primarily intended) but to all who want a brief introduction to the modern aspects of coördination chemistry. The discussions of ligand-field theory, and the comparison of it with the valency bond theory, and the chapter on carbonyls and  $\pi$ -complexes, are particularly well done.

While this volume can well serve as "An Introduction to Co-ordination Chemistry" it is not a general introduction, for many important topics are omitted, or are touched on only lightly. These come from classical coördination chem-