

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 deplors, 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 X 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 X 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 X 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 π -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-

istry, e. g., stereochemistry, olation, and the problems of synthesis, as well as from the findings of recent research, e. g., the mechanism of replacement reactions and the role of coordination compounds in catalysis, and determination of structure through studies of absorption in the infrared. It is unfortunate that the author has not used consistently the system of nomenclature recommended by the International Union of Pure and Applied Chemistry.

Although the reviewer has found a few minor errors in this book, he recommends it as portraying clearly and succinctly the current thinking on coordination chemistry.

DEPARTMENT OF CHEMISTRY
UNIVERSITY OF ILLINOIS
URBANA, ILL.

JOHN C. BAILAR, JR.

system, and the special relations involving the allotropic forms of iron in ternary alloys; but these are treated only for the sake of the general schematic relations illustrated. The book, first published in 1932, is therefore in no sense out of date. "Masing" has been the model for subsequent expositions of ternary diagrams, and the book is still unsurpassed for the thoroughness of its treatment of the fundamentals. It is thus still of great value, if not even a requisite, for the serious study of phase diagrams.

The reprinting is in every way as good as the original printing of the English translation (1944).

DEPARTMENT OF CHEMISTRY
NEW YORK UNIVERSITY
NEW YORK 53, N. Y.

JOHN E. RICCI

Name Index of Organic Reactions. By J. E. GOWAN, Ph.D., Lecturer in Organic Chemistry, University College, Dublin, and T. S. WHEELER, D.Sc., M.R.I.A., Professor of Chemistry, University College, Dublin. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. vii + 293 pp. 14.5 × 22 cm. Price, \$8.50.

Certain reactions, as well as rules and laws of nature, have for many years been named after their discoverers; the numbers were small, and names and reactions readily remembered. Some time was saved in this way, and the fact that a chemist is remembered with his contributions adds appeal to the usage. During the last two decades, it has, therefore, become quite general to refer to reactions by the names of their discoverers, but with the multitude of reactions and authors, a serious problem of memorizing has arisen. Wheeler and Gowan's "Name Index of Organic Reactions," published in 1950 as a pamphlet of 46 pages, was one of the earliest attempts to cope with this situation. The little booklet saved much time, incomplete though it was in regard to entries and to the lack of formulas. The new edition remedies both deficiencies. In a space more than 6 times that of the first edition, it presents an apparently complete list of name reactions and gains further in value by ample references to the literature, by a Type of Reaction Index and by a General Index.

The book not only makes easily available information on reactions which are referred to by their names and serves as a guide to the respective literature, but it may also be useful to some degree as a checklist for possible reactions. Anybody who shares with the reviewer a liking to leaf through encyclopedias may find it a "readable" book and a means of indulging this passion for superficial information. It should be a very useful book for every organic chemist.

RESEARCH LABORATORIES
EASTMAN KODAK COMPANY
ROCHESTER 4, NEW YORK

A. WEISSBERGER

Ternary Systems. Introduction to the Theory of Three Component Systems. By G. MASING. Translated by B. A. ROGERS. Dover Publications, 180 Varick Street, New York 14, N. Y. 1960. iv + 173 pp. 14 × 21 cm. Price, \$1.45.

This is a welcome reprinting of an excellent translation of a classic work. Masing's exposition of binary phase diagrams accomplishes its teaching purpose with remarkable brevity and consummate clarity. The book deals with the "theory" of three component systems in the sense of the principles of phase diagrams, in particular the spatial relations in the temperature-composition prism representing the liquid-solid equilibria of condensed ternary systems. These spatial relations, which are sometimes quite complicated, are minutely and patiently dissected, through pictures of "state spaces," projections and series of sections. The numerous diagrams are clear, ingeniously inter-related for consistency, and helpfully repeated when necessary to match the text.

The book deals essentially with the schematic relations for the fundamental elements of condensed ternary systems, involving solid solutions, compounds and two-liquid equilibria. The language is that of the metallurgist, "the sample" always being called "the alloy," but the presentation otherwise applies to all materials. Only three specific examples are considered, the aluminum corner of the iron-silicon-aluminum system, the copper corner of the tin-zinc-copper

α -Aminoalkylierung. Darstellung und Eigenschaften der Kondensationsprodukte H-Acider Stoffe mit Carbonylverbindungen und Aminen. By HEINRICH HELLMANN and GÜNTER OPITZ. Verlag Chemie, G.m.b.H., Pappelelle 3, Weinheim/Bergstr., Germany. 1960. xi + 336 pp. 17.5 × 24 cm. Price, DM 36, --

The major part of this book (about three fourths) deals with reactions of the type $AH + RR'C=O + HNR''R''' \rightarrow ACRR'NR''R''' + H_2O$ ("aminoalkylations") among which the Mannich reaction [*Org. Reactions*, 1, 303 (1942)] is the most prominent example. The remaining quarter of the volume deals mainly with reactions of the type $ACRR'NR''R''' + BH \rightarrow BCRR'NR''R''' + AH$ ("transaminoalkylations") and $ACRR'NR''R''' + BH \rightarrow ACRR'B + HNR''R'''$ [alkylations with Mannich bases and related compounds, cf. *Org. Reactions*, 7, 99 (1953)]. The senior author, H. Hellmann, is probably the world's foremost expert in the area of these reactions.

A monograph of this type necessarily slices across the body total of our knowledge of organic chemistry. It must be judged, in part, on the basis of whether the cross-section so exposed contains a maximum of correlated facts and excludes as little related information as possible. Based on this criterion the present volume scores highly—more so than the closely related book "Die Mannich Reaktion" by B. Reichert [reviewed by R. Stern in *J. Am. Chem. Soc.*, 83, 1519 (1961)]. Such seemingly diverse reactions as the Leuckart-Wallach reaction ("amino-alkylation of hydrogen," p. 83), syntheses of alkaloids under physiological conditions according to Robinson and Schöpf (p. 210) and the Pictet-Spengler tetrahydroisoquinoline synthesis (p. 216) are all dealt with or at least referred to in the book. However, the score is not perfect. For example, the synthesis of 1-benzylmercaptomethyl-2-naphthol by alkylation of benzyl mercaptan with 1-dimethylamino-2-naphthol described by Poppelsdorf and Holt, *J. Chem. Soc.*, 1124 (1954), is referred to in the section on condensation reactions of Mannich bases (p. 284), but the synthesis of the same compound developed in the same paper by direct condensation of 2-naphthol, formaldehyde and benzyl mercaptan (the equivalent of a Mannich reaction but using a mercaptan instead of an amine) is nowhere mentioned. Neither is it indicated that the reaction of 1-dimethylaminomethyl-2-naphthol with excess benzyl mercaptan gives 1-methyl-2-naphthol in 92% yield. Still in the same thought, this reviewer regrets that alkylations of simple amines and ammonium salts are not included in the section on alkylation with Mannich bases. Thus the reaction of 1-methylgramine with methyl cyanoacetate is discussed in some detail (p. 294), but the entirely analogous reaction of benzyldimethylamine with methyl cyanoacetate [Snyder, Eliel and Carnahan, *J. Am. Chem. Soc.*, 72, 2958 (1950)] is not covered.

Despite the senior author's major contributions to the mechanism of the Mannich reaction and to the mechanism of the alkylation with Mannich bases, the present monograph is largely descriptive; much of the information is summarized in tables. By the way of a caveat: the tables do not always appear to be complete; thus the reaction of gramine methiodide with various Grignard reagents [Snyder, Eliel and Carnahan, *J. Am. Chem. Soc.*, 73, 970 (1951)] is omitted from Table 13 (p. 279) although the analogous reaction of 1-methylgramine methiodide described in the same paper is included in Table 14 (p. 283). There is enough mechanistic and correlative thinking in the book to keep it from making dull reading, but the presentation of mechanistic reasoning is not as penetrating as in the authors'