

read the text more carefully—if he doesn't, he might miss something comical!) An especially attractive feature is the number of humane warnings about pitfalls and tough points. (On page 317, "The result . . . is correct and important. The derivation given is a fraud and a hoax." On page 379, "Although we shall review some of the mathematical operations, it is doubtful that readers who are unfamiliar with the elementary aspects of matrix algebra can profit from this section.")

On the negative side, there are a few places where one might wish for more clarity or detail, or a change in emphasis. On page 24 a rule is given for constructing quantum mechanical operators; on the following page it is qualified, and in fact only the qualified rule, called "safe" by the author, is correct. The name "Boltzon" is coined on page 36. This seems at first to be a useful addition to Fermion and Boson, until one realizes that all particles in nature are either of the latter, and that no Boltzons exist. The statement on page 91 that a single particle function q is not an intensive quantity, while q/N is intensive, is confusing. The principles of detailed balancing and microscopic reversibility are lumped together in a single statement (page 233) and are not carefully distinguished; this is a common source of semantic confusion in statistical arguments. The discussion of lattice specific heats, and in particular the graph on page 368 of a typical frequency spectrum, is somewhat out of date. It should include reference to the work of Van Hove, who showed that there are important discontinuities in such graphs.

In summary, this is an excellent textbook of practical statistical mechanics. Graduate students in physical chemistry are urged to become acquainted with its contents.

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Gmelins Handbuch der Anorganischen Chemie. Achte Völlig Neu Bearbeitete Auflage. Calcium. Teil B—Lieferung 3. Schluss der Verbindungen Chemisches Verhalten des Calcium-Ions Nachweis und Bestimmung von Calcium, Strontium und Barium. System-Nummer 28. Edited by Gmelin-Institut. Begonnen von R. J. MEYER. Fortgeführt von E. H. ERICH PIETSCH. Verlag Chemie, G.m.b.H., Pappelallee 3, Weinheim Bergstr., Germany. 1961. lxii + 912 pp. 18.5 × 25.5 cm. Price, DM. 568.— (\$142.00).

Part B, Section 3, of the volumes dealing with calcium, completes the summary of calcium compounds, discusses the reactions of the calcium ion, and summarizes the detection and determination of calcium, strontium, and barium. Treatment of the compounds begins with the calcium-sulfur-oxygen system and continues according to the well-established Gmelin pattern through the binary and ternary compounds of calcium with the non-metallic elements of Groups VI, V, IV, and III. Reactions of the calcium ion include those with both inorganic and organic species. Both qualitative and quantitative analytical approaches are described, and many procedures applicable to specific substances or products are outlined. Throughout, all items have been particularly carefully and critically documented. The inclusion of a Table of Contents and marginal indexing in English—now standard practice in the Gmelin series—makes the contents of the volume even more accessible than they would normally be.

The general treatment presents a wealth of detailed chemical and physico-chemical information. Usual data of the latter type are supplemented by an extensive treatment of phase diagrams involving a variety of calcium-containing systems. It is most unlikely that any aspect of the areas covered has been slighted.

This volume is a worthy addition to the Gmelin series. As a source of useful and correct information, it has no competitor. The printing, binding, appearance and general presentation are attractive and practical. It is recommended without reservation to anyone seeking information in these areas.

NOYES CHEMICAL LABORATORY
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Gmelins Handbuch der Anorganischen Chemie. Achte Völlig Neu Bearbeitete Auflage. Kobalt. Teil A. Ergänzungsband. System-Nummer 58. Edited by Gmelin-Institut. Begonnen von R. J. MEYER. Fortgeführt von E. H. ERICH PIETSCH. Verlag Chemie, G.m.b.H., Pappelallee 3, Weinheim/Bergstr., Germany. 1961. lxxii + 886 pp. 18.5 × 25.5 cm. Price, DM. 556.— (\$139.00).

Part A of the volumes on cobalt presents a broad summary of the history, occurrence, technology, properties and alloys of the element, the chemical reactions of its ions, and the compounds it forms with both non-metallic and metallic elements. Included in the last category are many of the coordination compounds, but no attempt is made to treat these separately as a particular class of compounds. Each area is handled with the characteristic and highly commendable Gmelin thoroughness and comprehensive documentation. The volume is a definitive source of an almost unbelievably large amount of chemical and physico-chemical information pertaining to cobalt and its compounds. Access to this information is of course improved by the inclusion of a supplementary Table of Contents and marginal indexes in English.

Particular attention has been given both to recently published information and to physical data. The volume contains many tabulations, a large number of pertinent graphs and diagrams, and a substantial number of pictorial representations of crystal structures. All of these are included logically where they can best describe the substances in question.

It is difficult to discuss any volume in the new Gmelin series in other than superlatives. This is no exception. It is recommended as undeniably the best and most comprehensive compilation available on cobalt chemistry. No person or concern interested in any of the areas covered can afford to be without access to it.

NOYES CHEMICAL LABORATORY
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Gmelins Handbuch der Anorganischen Chemie. Achte Völlig Neu Bearbeitete Auflage. Kupfer. Teil B—Lieferung 2. Verbindungen bis Kupfer und Wismut. System-Nummer 60. Edited by Gmelin-Institut. Begonnen von R. J. MEYER. Fortgeführt von E. H. ERICH PIETSCH. Verlag Chemie, G.m.b.H., Pappelallee 3, Weinheim/Bergstr., Germany. 1961. xli + 352 pp. 18.5 × 25.5 cm. Price, DM. 231.— (\$58.00).

This volume in the series on copper describes, according to the well-established Gmelin sequence, the binary and more complex compounds of the element based upon boron, carbon, silicon, phosphorus, arsenic, antimony and bismuth. Understandably, the major amount of space is allotted to the copper(II) salts of the organic acids. The treatment throughout is comprehensive and definitive, with emphasis being divided between descriptive information and physical data. Coordination compounds and complex ions are discussed as the ligands from which they are derived are treated, but not in separate sections. Graphic representations of structure and phase diagrams are included where data are available.

All of the virtues of meticulous attention to detail, comprehensiveness, direct and up-to-date literature citation, and clarity of presentation that characterize the Gmelin series are apparent for this volume. These are complemented by the inclusion of a Table of Contents and marginal indexing in English. Although the area encompassed is somewhat limited, the volume is a "must" for any technical library and a highly recommended source for any person who is pursuing copper chemistry.

NOYES CHEMICAL LABORATORY
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The Metal Plutonium. EDITED BY A. S. COFFINBERRY and W. N. MINER. The University of Chicago Press, 5750 Ellis Avenue, Chicago 37, Illinois. 1961. xi + 446 pp. 16.5 × 24.5 cm. Price, \$9.50.

The chapters of this book were originally presented as papers at the 1957 World Metallurgical Congress in Chicago

under the auspices of the American Society for Metals and the United States Atomic Energy Commission. Some of the material has been updated to take account of knowledge gained since 1957. For the average reader, this book has the drawbacks usually associated with a collection of individual papers. There is duplication, variation in emphasis, and lack of uniformity in presentation. However, the scientist or engineer who is looking for source material or historical background concerning plutonium and plutonium metallurgy will find much of interest.

Part I devotes about ninety pages to a historical review. The nine chapter titles are: The Discovery of Plutonium in the Cyclotron, The First Isolation of Plutonium, The Microscale Preparation and Micrometallurgy of Plutonium Metal, Plutonium Metallurgy at Los Alamos during 1943-45, Later Plutonium Metallurgical Research at Los Alamos, Plutonium Metallurgy at the Argonne National Laboratory, Studies on Plutonium at Chalk River, Metallurgical Studies on Plutonium in Great Britain, Plutonium Metallurgy in France. These titles reflect the multiple coverage and duplication which characterize much of the book.

Part II, Plutonium Metallurgy, is the major part of the volume, over two hundred pages, and many will find it the most useful. Some hitherto unpublished research results are included. The seventeen chapters include contributions from Canada, England, France and the United States, plus a summary of plutonium phase diagrams published by the Russians.

Part III of the volume, Plutonium in Nuclear Reactors, about ninety pages, is fragmentary and outdated. Most readers will find it the least valuable of the three parts.

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Molekülverbindungen und Koordinationsverbindungen in Einzeldarstellungen. Komplexbildung in Lösung. Methoden zur Bestimmung der Zusammensetzung und der Stabilitätskonstanten gelöster Komplexverbindungen. By HANS L. SCHLÄFER, Dr.phil.nat., Privatdozent am Institut für Physikalische Chemie der Universität Frankfurt am Main. Springer-Verlag, Heidelberger Platz 3, Berlin-Wilmersdorf, Germany. 1961. x + 348 pp. 16.5 X 24 cm. Price, DM. 59.60.

It is unfortunate, but inevitable, that this review must be in part a comparison with "The Determination of Stability Constants" by F. J. C. and Hazel Rossotti, which was reviewed in these pages recently (*J. Am. Chem. Soc.* **84**, 882 (1962)). Much of the material in this book can also be found in the Rossottis' book, although the organization and some of the treatments differ considerably.

The Rossottis devote the first chapters to fundamental principles and general considerations, while Dr. Schläfer plunges directly into the specific methods and presents the theories and principles as he proceeds with his treatments. At the same time he treats polynuclear and mixed complexes along with the simpler systems, under the headings of the methods appropriate to their study, while the Rossottis treat these topics separately at the end of the book.

This book is divided into eleven main chapters. First there is a brief introductory chapter, which is followed by sections devoted to examining complex formation by various specific methods: diffusion and dialysis measurements, solubility methods, solvent extraction methods, a variety of potentiometric methods, polarography, conductometric and amperometric methods, spectrophotometry, refractometry, ion exchange methods and a very brief section on "other different methods." The last is scarcely more than an introductory bibliography to a dozen and a half new or seldom used methods but does not include kinetic methods (see Rossotti and Rossotti, chapter 14) and has much less detail than chapter 15 of the Rossottis' book.

This volume is very well organized and is reasonably easy for the English-speaking, German-reading scientist to read or to translate. The symbols are familiar for the most part (English or Greek) and the reader is not often required to notice subtle differences in type in order to differentiate the various symbols. Although the simplicity of the notation

makes a glossary of symbols less than absolutely necessary, such a general table, for this book as a whole, should have been added.

The long chapter on potentiometric methods seems, to this reviewer, to be exceptionally well done and to be sufficiently complete to enable one to step into the laboratory and to begin to make measurements. The basic principles are presented first and then each of several of the important methods of treating potentiometric data is given (*e.g.*, the methods due to Bjerrum, Leden and Fronaeus). Examples of the application of each method are presented as well as additional references. The application of potentiometric methods to the study of polynuclear complexes is also presented, clearly and in sufficient detail.

Spectrophotometric methods, too, are approached with more than a little skill and with gratifying thoroughness. The form of this section follows that in the chapter on potentiometry. The more important methods are presented well and each of them is followed by examples. Even the troublesome "method of continuous variations" is examined carefully and its limitations and difficulties are rather clearly stated.

The chapters on solvent extraction and on ion exchange are also well done, but the first of these, at least, seems to be treated more smoothly by the Rossottis.

This reviewer is particularly interested in the questions of concentration constants *vs.* thermodynamic constants and of the attendant evaluation or estimation of activity coefficients. This book, like that by the Rossottis, recognizes the problems at the outset and treats them fairly well in connection with solubility and ion exchange. Otherwise approximate constancy of activity coefficients, under conditions of constant ionic strength, is generally assumed. It would seem that there ought to have been a chapter (or section in the first chapter) where the problems of getting thermodynamic constants and those of estimating activity coefficients (for systems of the sort treated in this book) were considered with care.

"Komplexbildung in Lösung" is a well written and useful reference book and will doubtless find a place on many a specialist's shelves along with "The Determination of Stability Constants." Because of the general similarities and language advantage, one would guess most American workers will reach for the latter volume.

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Nouveau Traité de Chimie Minérale. Tome XV. Uranium and Transuraniens. Deuxième Fascicule. Edited by PAUL PASCAL. Masson et Cie., 120 Boulevard Saint-Germain, Paris (6^e), France. 1961. 1 + 639 pp. 17.5 X 25.5 cm. Price, broché, 110 NF.; cartonné toile, 122 NF.

This work, *Combinaisons de l'Uranium*, is the second of three parts of the fifteenth volume of a remarkably thorough treatise of inorganic chemistry. In this book the voluminous literature dealing with the combinations of uranium with other elements has been concisely and clearly summarized. Ten collaborators, under the immediate direction of R. Caillet and J. Elston and the general direction of Paul Pascal, have assembled twelve excellent chapters dealing with the known compounds of uranium, as well as three chapters of a miscellaneous nature, dealing with the fission products of uranium, pyrometallurgical treatment of irradiated uranium and the hazards encountered in handling uranium, thorium and the transuranic elements. The chapters dealing with the hydride, fluorides, chlorides, bromides, iodides, oxides, nitrides, sulfides and carbides of uranium are the most noteworthy.

The book is well-organized, completely documented, clearly printed on good paper, and beautifully illustrated. It should be highly recommended as an authoritative source of information to those specializing in uranium chemistry.

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