on synthesis of inorganic compounds, F. P. Dwyer surveys the methods and principles of synthesis of a number of inert chromium(III) and cobalt(III) compounds. The lecture on structure and sterochemistry by R. J. Gillespie is a review of the Sidgwick–Powell and Gillespie–Nyholm concept of the "best" arrangement of electron pairs about a central ion. This concept has been extended to coordination numbers 7, 8 and 9 with a number of specific examples. G. Wilkinson discusses metal–hydrogen bonds, pointing out that a number of supposed low-oxidation state metal complexes are more likely hydride complexes of higher oxidation state metals. Also discussed are a number of π-bonded hydrocarbon–metal derivatives. In a lecture on the bio-chemical significance of coördination compounds, R. J. P. Williams discusses, in particular, the role of molybdenum and cobalt in biological systems. H. Zeiss discusses the role of several metal "sandwich" compounds as intermediates in the reaction of phenyl Grignard reagent to give biphenyl. Finally, K. B. Yatsimirski reviews the methods of measurement of stability constants and discusses the significance and origin of the enthalpy and entropy terms. Of particular interest here, is the application of metal ion catalysis of reactions to the determination of stability constants of complexes of the metals, which, in the opinion of the author, is one of the more promising of the new stability constant methods.

The papers cover this same broad range of interest but each, of course, is of less general interest. The reader seeking detail may, in some cases, not be satisfied. While many of the papers are detailed and complete, others are merely abstracts, while others are either short or long reviews. Most are well referenced and, while some of the results may only be preliminary, the greatest value of the collection is that it serves as a spot-survey of the voluminous research being done in inorganic chemistry.

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Phosphorus and its Compounds. Volume II. Technology, Biological Functions and Applications. Edited by JOHN R. VAN WAZER, Senior Scientist, Monsanto Chemical Company, St. Louis, Missouri. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N.Y. 1961. xvi + 1092 pp. 16 × 23.5 cm. Price, $35.00.

The second volume of the set describing the technology and the various applications of phosphorus appears some three years after the first volume of this useful publication.

The author dedicates this volume to "the salesman of phosphorus products. . .," although in my opinion the material covered in this book covers much more ground than might be indicated by such a dedication. The nineteen chapters of this volume are grouped as to general areas of: technology (six chapters, dealing with occurrence and mining, utilization and economics, wet-process phosphoric acid, fertilizer manufacture, manufacture of elemental phosphorus and major inorganic compounds, and manufacture of phosphate esters and organic phosphorus compounds), biological functions (three chapters dealing with phosphates in life processes, phosphates in biological macromolecular synthesis and energy mechanisms, and mineralized tissues) and applications (ten chapters, dealing with plant nutrition and utilization of fertilizer phosphorus, animal nutrition and phosphates in feeds, food and dentifrice applications, action of phosphates on finely divided solids, detergent building, hard-surface cleaning and water treatment, phosphorus in metallurgy, surface treatment of metals, uses of organic phosphorus compounds, and miscellaneous applications). Four appendices listing patents on phosphates in their principal applications are provided, along with an index of some 32 pages.

Unlike the first volume of this set, which was written quite evenly and with an evidently single purpose, the present volume covers such a diversity of subjects, some of which are not chemical by their nature, that a uniform mode of presentation is not achieved, even if such were possible.

As might have been expected, the bulk of material contained in this well manufactured volume discusses in considerable detail the aspects of phosphorus as a component of various articles of commerce. The large scale uses of the element and its compounds are given the lion's share of the book and appropriate citations of economic facts support this treatment quite adequately. The manufacturing aspects of inorganic phosphates are dealt with in considerable detail and should prove useful to the many persons engaged in phosphate business. Both chemical and engineering data are provided for the reader in convenient form and in very readable language. The readers with the more scientific bent of mind will find an excellent summary of information on the action of phosphorus compounds in systems with large surfaces and small particles, *i.e.*, the fields in which enormous amounts of phosphates are used all over the world.

On the other hand, readers interested in the role of phosphorus in biochemistry may well be disappointed by the small share of this volume devoted to this general topic. This fact was undoubtedly generated by the tone of the volume indicated by the dedication. This section does provide a reader with the general picture of the metabolic role of the element, but in a field moving so rapidly in the past decade, one cannot expect such a treatment to be completely up-to-date or exhaustive within the allowed space. It may be added that the statement appearing on p. 1389 may well be argued by physical chemists (". . .free energies merely represent a fancy way of reporting equilibrium constants"). Treatment of the applications of organic compounds of phosphorus also appears to be rather skimpy; probably, for the same reason.

In other words, this volume is addressed primarily to the inorganic chemist (or salesman).

Some application topics which are growing extremely rapidly and (hopefully) profitably seem to have received unduly short discussions. These are the oil additives and functional fluids, especially the latter. As indicated by the author, the latter formulations are proprietaries whose formulations are jealously guarded by the manufacturers. This is made very clear to the reader of such sections in which Trade Names only are used and the chemist is left out in the cold. In other words, a person not in the business would not even know what compounds are under discussion. While reticence in matters of business and economics is quite understandable, material of this nature does not appear to be particularly useful to a "lay" reader or even to a practicing chemist.

On the whole the volume is a fair presentation of the practical aspect of phosphorus chemistry. A pure scientist will not find very much material to digest from it, except for the few sections mentioned. A practical man will find vast amounts of useful information and all the charts and diagrams that his heart could desire.

The book is well made, even at its price, and the illustrations are generally good and to the point. One useful feature of the volume is the seven page insert of errata found in the first volume of this set. It is to be hoped that the second volume will have a much shorter list of errata (this is borne out by my examination).

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The Pfizer Handbook of Microbial Metabolites. By MAX W. MILLER, Ph.D., Pfizer Medical Research Laboratories, Chas. Pfizer and Co., Inc. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, N. Y. 1961. x + 772 pp. 16.5 × 23.5 cm. Price, $15.00.

This volume is a comprehensive listing of the compounds produced by microörganisms from carbohydrates. The latest proposed or accepted structures are given. Some useful properties and at least one pertinent reference to each compound are given. The substances are arranged, as far as possible, in chapters of chemically related compounds.

Most chapters have an introduction summarizing the literature pertinent to the group in the chapter, "emphasizing occurrence and biosynthetic background."

Three appendices on the chemical composition of various bacteria and fungi are included. There is an Addendum (not indexed) of recent material bringing the information up to 1961. The volume is indexed by microörganism and subject.