

Chemical Analysis of Organometallic Compounds, Vol. 5. Elements of groups VIA, VIB, VIIA, VIIB, aluminium and zinc. By T.R. Crompton, Academic Press, London/New York/San Francisco; 1977, xi + 432 pages, £24.00; U.S. \$46.90.

The fifth book in this now established series of volumes deals with organic derivatives of Cr, Mo, W, U, Se, Te, Mn, Fe, Co, Ni, Pd, Ru, Al and Zn. As in the earlier volumes, the author describes not only the chemical methods of determining the elements in organometallic compounds, but also direct spectroscopic (and, where relevant, microbiological and radiological) determination of specific organometallic compounds, and chromatographic methods of separation. For example, there are substantial accounts of the determination and separation of haemoglobins and cobalamins, and the account of the analysis of ferrocene includes potentiometric titration, polarography, chromatography (column, paper, thin layer, and gas-liquid), IR, UV, NMR and ESR spectroscopy, mass spectrometry, and X-ray diffraction. There are, of course, wide variations in the amounts of information available for the various elements; thus the account of compounds of aluminium takes up 263 of the 432 pages, while organic compounds of the platinum metals are dealt with in 16 lines. There are good author and subject indices.

This volume, like its predecessors, is a valuable reference work for all those engaged in analysis of organometallic compounds.

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Phosphorus. An Outline of its Chemistry, Biochemistry and Technology.  
D. E. C. Corbridge, Elsevier Scientific Publishing Co., Amsterdam, 1978  
viii + 456, \$59.60.

Phosphorus forms an enormous number of compounds, many of great practical or biological significance, and every aspect of the chemistry of this element is included in this book. Compressed into its 435 pages of text are discussions of the element itself and of its metallic and non-metallic derivatives, of phosphates both organic and inorganic, of

with carbon-phosphorus bonds, and of various classes of compounds in which are found phosphorus bonded to nitrogen, sulfur, or Groups III and IV elements. Treatment is also given to compounds with P-P bonds, and with P in cyclic systems and in polymers. The practical use of many of the compounds is mentioned, and a large part of one chapter is devoted to the biochemistry of organic phosphates found in living systems.

With coverage of this scope in so relatively brief a book, it is obvious that details on any one topic are minimal. In fact, the treatment is sometimes just a cataloging of various reactions, without providing details of mechanism, practicality, or scope of a given reaction. For example, in the 61 pages of a chapter devoted to the very large field of compounds with carbon-phosphorus bonds, no fewer than 402 numbered equations are given, not to mention several compact figures where many products derivable from a key starting material are given without comment. One consequence of this encyclopedic treatment is that it makes the appreciation and the learning of the true fundamentals of the field quite difficult; the reader hoping for an introduction to phosphorus chemistry may well feel overwhelmed by the enormity of the subject and may not be able to pick out the significant parts. It might also be expected of a coverage so broad that errors of fact or interpretation would be frequent, but the author has done an admirable job in writing authoritatively on so many aspects of the field, although errors can be found (e.g., on p. 173 the McCormack cycloaddition of  $\text{MePCl}_2$  with a diene is shown incorrectly as proceeding with evolution of elemental chlorine, as is the reaction of  $\text{MePCl}_2$  with acrylic acid; on p. 205, the natural occurrence of 2-aminoethylphosphonic acid (AEPA) is more widespread than in "Japanese sea anemones (sic) and some shellfish", and there is no reaction such as that on the same page where AEPA is shown undergoing direct reaction with  $\text{CO}_2$  to form the  $\alpha$ -aminocarboxylic acid; on p. 397, reaction of optically active phosphines with  $\text{HX}$  does not occur with inversion of configuration; on p. 430, in an all-too-brief description of the use of NMR in phosphorus chemistry, the  $^{31}\text{P}$  signal of  $\text{P}(\text{OCH}_3)_3$  is said to be a 9-line multiplet due to coupling with the 9 protons (the  $n + 1$  rule does apply!); on p. 334, phosphine sulfides are not generally oxidized by air, etc.).

The author chose not to give any references to the original literature in cataloging the various reactions and properties; this may be viewed by some as a major shortcoming of the book, for there is no fast way to check up on any peculiar reaction noted, or to follow a new interest to its source. This also reduces its value to the experienced

phosphorus chemist looking for a leading reference. As an aid to getting into the literature, however, the author has provided with each chapter an excellent list of reasonably recent review articles, chapters, or monographs.

The nomenclature of phosphorus compounds, made so complex by the multitude of structural possibilities, is handled well throughout the book, with only a few lapses (e.g., in Table 4-1 (pp. 153-4), there are four instances where acid derivatives are misnamed, such as calling  $\text{H}_2\text{P}(\text{O})(\text{OEt})$  "ethyl phosphinic acid"; on p. 413, the curious designation of  $\text{H}_3\text{P}^{\cdot-}$  as a "phosphonium radical anion" is used). Typographical errors not numerous; in the hundreds of structural formulas, only a dozen or so were detected. On numerous occasions, a smaller type is used for topics the author appears to consider of secondary importance; some of these sections extend unappealingly over two or more pages, and the basis of the selection of the material to be so down-graded is not always obvious.

The author is to be congratulated for compiling such a comprehensive outline of the chemistry of a major element. It is not an easy book to read because of its terseness and lack of explanatory or interpretive material. But it is a good source of information on the vast number of reactions and properties known for phosphorus compounds, and in general it appears to be a worthwhile addition to the growing literature of this field.

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