Book Reviews

Phosphorus, An Outline of its Chemistry, Biochemistry and Technology

By D. E. C. Corbridge, Studies in Inorganic Chemistry 10, published by Elsevier, Amsterdam, 4th edition, 1990, 1093 pp., US $333.25.

The fourth edition of *Phosphorus, An Outline of its Chemistry, Biochemistry and Technology* is a completely revised and updated version of the well known textbook; various sections have been added particularly in the area of biologically relevant compounds. The book now has 14 chapters with several appendices and a total of 1093 pages.

Chapter 1 gives a general introduction to phosphorus chemistry including a collection of interesting data of phosphorus element bond lengths and force constants. The second chapter contains a most instructive section about the structural chemistry of phosphides; however, a brief description also of recent developments and modern bonding concepts, e.g. of Zintl phases, would be a valuable supplement. Chapter 3 gives a comprehensive presentation of all aspects of organic and inorganic phosphates and their coordination compounds with transition and main group metals; biologically relevant systems and technological applications are discussed as well. The fourth chapter presents organic phosphorus chemistry of all oxidation states and coordination geometries of phosphorus and gives a well selected, timely overview of the voluminous literature in this area. The following chapters are devoted to phosphorus nitrogen compounds (polyphosphazenes, monomolecular and pentacoordinated compounds) (5); to agro- and medichemicals (6); and to phosphorus chemistry with group 16 (7), group 13 and group 14 (9) elements. A further chapter (8) deals with carbon phosphorus compounds containing more than one phosphorus atom. Since all subjects have been revised rigorously, reading of the chapters is informative and interesting. The large area of coordination compounds of phosphorus is summarized in one chapter (10). As in most textbooks, the subject has been organized with respect to the ligands and their chemistry; some brief comments on reaction mechanisms and catalytic properties are also given.

A large section of the book (Chs. 11–13) accounts for the growing interest in bioinorganic issues. Three chapters are devoted to the role of phosphorus in biochemistry. The discussed topics include biopolymers (11); nutrition, food technology (12); and metabolic processes, as well as DNA structure and replication (13). The introduction of themes of biological interest gives new impulses and certainly will increase will increase the attractiveness of the book.

The last chapter (14) presents some topics of special interest like hydrogen bonding, stereochemistry and isomerism in phosphorus compounds and a section about short lived species.

The appendices give a literature selection, some comments to nomenclature and tables of physical properties (with hazards) of selected phosphorus compounds. The index provides references to important keywords.

This wide overview of important aspects of phosphorus chemistry distinguishes the book as a most valuable source of information for both advanced students and research chemists. It is not the intention of the author to give a full and comprehensive summary of the current status of research in all areas, but the important developments are accounted for by a selection of representative and leading references. The organization of the text is exemplary and its clear and precise style of presentation is convincing. The 'camera ready' format of the book allows a price of US $333.25. *Phosphorus* by D. E. C. Corbridge should be present in every library as a valuable reference book and on the bookshelf of any chemist who is interested in a broader presentation of phosphorus chemistry.

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Progress in Inorganic Chemistry, Volume 37

Edited by S. J. Lippard, published by Wiley, New York, 600 pp., ISBN 0-471-62297-4.

The new volume of this prestigious series contains seven contributions.

There is a review (98 pages, 350 refs.) by B. Lippert on 'Platinum Nucleobase Chemistry'. The interactions of platinum with the potential and actual donor atoms of the nucleobase is discussed together with the spectroscopic tools. The scientific authority

of the author and a clear presentation of the many data make this review precious for the researchers in the area.

An article by G. W. Brudvig and R. H. Crabtree deals with the bioinorganic chemistry of manganese related to photosynthetic oxygen evolution (36 pages, 126 refs.). The most recent theories on the role of manganese in photosynthesis are discussed together with proposed mechanisms of oxygen evolution. The coordination chemistry of manganese complexes and manganese clusters is reviewed.

J. M. Berg presents a review on metal binding domains in nucleic acid binding and gene regulatory proteins (34 pages, 185 refs.). Seven groups of proteins are discussed among which the most familiar to bioinorganic chemists are the zinc fingers proteins. The possible role of metal ions is discussed.

A review of 100 pages and 128 refs. is devoted to 'Molecular Mechanics Calculations as a Tool in Coordination Chemistry' by R. D. Hancock. The utility of MM is shown in understanding the chemistry of a large variety of complexes from those obtained with open chain ligands, macrocycles, superchelates, siderophores, etc.

E. Krauz and J. Ferguson present 90 pages with 209 refs. on the spectroscopy of $Ru(bipy)_3^{2+}$. It is an impressive work for specialists!

M. J. Natan and M. S. Wrighton present a review on chemically modified microelectrode arrays (95 pages, 183 refs.).

T. S. Lobana presents a review on 'Structure and Bonding of Metal Complexes of Tertiaryphosphines-arsine Chalcogenides' (90 pages, 406 refs.). It is a complete review on spectroscopic, structural catalytic and thermodynamic aspects of these complexes.

This book will certainly be attractive to a large variety of researchers in inorganic and bioinorganic chemistry. It is worthy to have on the shelf or in the library.

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Structure and Reactivity

Edited by Joel F. Liebman and Arthur Greenberg, published by VCH Publishers, Inc., New York, 1990, 385 pp., DM 195.

Prediction of chemical reactivity from the ground-state structure of a molecule remains a prime goal in chemistry. In spite of the extreme refinement of experimental techniques such as high resolution X-ray crystallography, electron diffraction and microwave spectroscopy, and of tremendous improvements in calculations techniques which complement experimental studies, the translation of the conclusion to the solution phase, where most chemistry is done, is still not self-evident. This book presents a series of essays concerned with different aspects of these approaches.

The first chapter by Politzer and Murray introduces their calculational construct of the bond deviation index and relates this to the strain of various carbocycles and to the electrostatic potentials in these molecules. The following chapter, by Klein and Stevens, complements the preceeding contribution, discussing electron density distributions and electrostatic potentials from the experimentalist's point of view. The concept of molecular strain is also reexamined by Cremer and Kraka which shows that the topology of electron density distribution provides valuable insights into reactivity. Greenberg explores the distortion of the seemingly familiar amide linkage which is so vital in proteins, antibiotics and polymers. A crucial contribution from Mitsuhashi is devoted to the relationship between solid-state structure and reactivity, and the role of solvation, so critical in all solution chemistry, is discussed. The following chapter, by Krygowski, explicates crystal derived structures in terms of canoni references structures. The chapter by Iyer and Slagg identifies the structural features which characterize explosives, propellants and other high energy species. The final chapter, by Schulz and Schweig, deals with one of the most active areas of UV photoelectron spectroscopy, that is, the identification of valence shell ionization energies in transient molecular species.

The prime feeling which emanates from this book is the evident enjoyment each author had to write his chapter. Even if only senior firmly educated readers will be actually capable of taking full advantage of such top contributions, this book must be acquired for proving to the young co-workers that enthusiasm may exist within the world of Research!

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