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Phosphorus, Sulfur, and Silicon and the Related Elements

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A Review of: "Phosphorus, An Outline of its Chemistry, Biochemistry, and Technology, by D. C. Corbridge (University of Leeds, U.K.). Elsevier Scientific Publishing Co., Amsterdam, Third Edition, Jan. 1985. 761 pp. (U.S. \$157.50)."

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BOOK REVIEW

Phosphorus, An Outline of its Chemistry, Biochemistry, and Technology, by D. C. Corbridge (University of Leeds, U.K.). Elsevier Scientific Publishing Co., Amsterdam, Third Edition, Jan. 1985. 761 pp. (U.S. \$157.50).

The fact that this book has reached a third edition, previous editions having been published in 1977 and 1980, suggests that it has filled a need, with which these reviewers concur. Keeping pace with the rapid advance and increasing interest in phosphorus chemistry, "Corbridge" has grown to 761 from its original 464 pages. The price has more than tripled which seems high for a book apparently printed from typed, camera-ready copy.

The author is a recognized expert on structural chemistry and infrared spectroscopy of phosphorus. He has accomplished the Herculean task of outlining, in a single volume, the whole of inorganic, organic, analytical, biochemical, industrial, and environmental phosphorus chemistry and technology. He has chosen to deal only lightly with mechanistic and other theoretical aspects, but has managed to include a few pages on the academically fashionable topic of mutarotation in a Special Topics chapter. A new chapter on biochemistry has been added to this edition, as well as an expanded discussion of agrochemical products. The book also contains some useful appendices on nomenclature, hazards and properties of elemental phosphorus and phosphoric acid.

The reviewers concur that the book will be of much more use to a new entrant to the subject desirous of a broad survey of phosphorus chemistry. A substantial portion of the book consists of chemical equations, often in tabular or chart form, which facilitates rapid review without the reader becoming enmeshed in unwanted detail. Industrial chemists may be pleased also that the coverage emphasizes the more utilitarian and typical reactions rather than the more anomalous and mechanistically intriguing ones. Academically fashionable topics of mono-, di-, and hexacoordinated phosphorus compounds are given only brief coverage.

One frustrating feature of the third edition is carried over from the earlier editions. None of the statements or equations, or even the subtopics, is individually referenced. The reader's only recourse is to a list of Further Reading references at the end of each chapter, and often redundant from chapter to chapter. The reader is not given any help in ascertaining which of these generally broad reviews or monographs contains the details on the item in question; a needle-in-a-haystack search often ensues.

Although this edition corrects many of the errors and omissions of the first edition, there are still a fair number of misstatements, sometimes on matters of importance. For example, the cause of the occurrence of the toxic bicyclic phosphate in the pyrolysis fumes from certain polyurethane foams is incorrectly ascribed to a particular phosphate rather than to the presence of trimethylolpropane polyol. Some very important and scientifically interesting commercial products are barely mentioned (example: glyphosate) or not mentioned at all. The important commercial use

of triaryl phosphates as hydraulic fluids is not mentioned, although this edition now correctly states the reason for the use of triaryl phosphates as plasticizers in thermoplastics. A brief discussion of phosphate surfactants is somewhat misleading and fails to give an idea of their broad utility. Phosphorus oligomers used in flame retardancy are not mentioned. The important and mechanistically interesting use of phosphites as antioxidant synergists in polyolefins is not discussed.

Despite the shortcomings noted, this new edition of Corbridge's *Phosphorus* can be recommended as a serviceable introduction for the new industrial or academic worker in phosphorus chemistry. It is probably the best overview currently available of this important field of chemistry.

E. D. Weil and K. E. Reineke