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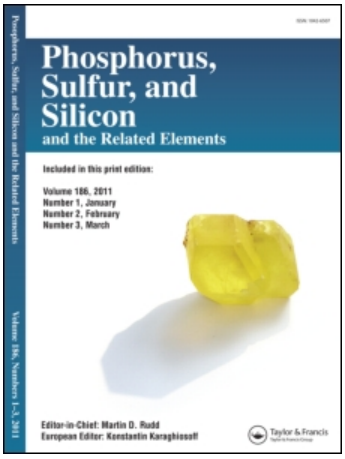

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BOOK REVIEW

Phosphorus-31 NMR: Principles and Applications, David G. Gorenstein, ed., ISBN 0-12-291750-2, Academic Press, Inc., Orlando, Florida, 604p., $79.00 (£ 69.00).

This monograph represents the first attempt to review the entire subject of the NMR of phosphorus since the comprehensive fifth volume of Topics in Phosphorus Chemistry by Crutchfield, Dungan, Letcher, Mark and Van Wazer (Wiley, 1967). In the latter, the table of chemical shifts comprising the last chapter contained data on 3253 compounds and represented the entire literature, including many private collections of data, through August, 1966. The growth of the field in the intervening decades is noted by Professor Gorenstein in his book: "It is now impossible to cover all of the available literature in a single monograph." He notes that the Specialist Periodical Reports cite over 900 selected publications that are entirely or in large part devoted to ^{31}P-NMR spectroscopy (1969–1980) and a computer search of Chemical Abstracts from January, 1979, to June, 1982, produced over 800 citations. This no doubt does not represent all papers reporting chemical shifts of phosphorus compounds. As a result, the new monograph is deliberately limited to selected citations and emphasizes recent work. The last chapter contains a table in the earlier format with selective data on chemical shifts and coupling constants for about 400 compounds. There is a short index and a list of the twenty contributors of the 17 chapters in the front of the book.

The monograph is divided into four parts, the last being the abovementioned compilation of data by the editor and Dinesh O. Shah. The first part consists of some 45 pages and two chapters on Phosphorus-31 Chemical Shifts: Principles and Empirical Observations, by the editor, and Phosphorus-31 Spin-Spin Coupling Constants: Principles and Applications, also by the editor. Part 2 contains about 420 pages and 13 chapters as follows: Phosphorus-31 NMR of Enzyme Complexes, by B. D. Nageswara Rao; ^{31}P-NMR Studies of Phosphoproteins, by Hans J. Vogel; Paramagnetic Probes of Enzyme Complexes with Phosphorus-Containing Compounds, by Joseph J. Villafranca; Use of Chiral Thiophosphates and the Stereochemistry of Enzymatic Phosphoryl Transfer, by Ming-Daw Tsai; Use of Chiral [^{16}O, ^{17}O, ^{18}O] Phosphate Esters to Determine the Stereochemical Course of Enzymatic Phosphoryl Transfer Reactions, by John A. Gerlt; DNA and RNA Conformations, by Chi-Wan Chen and Jack S. Cohen; High-Resolution ^{31}P-NMR Spectroscopy of Transfer Ribonucleic Acids, by the editor; Phosphorus-31 NMR of Drug-Nucleic Acid Complexes, by the editor and Evelyn M. Goldfield; Phosphorus Relaxation Methods: Conformation and Dynamics of Nucleic Acids and Phosphoproteins, by Phillip A. Hart; Relaxation Behavior of Nucleic Acids: Dynamics and Structure, by Thomas L. James; Solid-State Phosphorus-31 NMR: Theory and Application to Nucleic Acids, by Heisaburo Shindo; Phosphorus-31 NMR of Phospholipids in Micelles, by Edward A. Dennis and Andreas Plückthun; and Phosphorus-31 NMR of Phospholipids in Membranes, by Ian C. P. Smith and Irena H. Eikiel.

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Part 3, entitled Application to Biology and Medicine: Future Directions, contains about 66 pages and two chapters on: Two-Dimensional Phosphorus-31 NMR, by William C. Hutton, and Identification of Diseased States by Phosphorus-31 NMR, by Michael Bárány and Thomas Glonek.

The main part of the book is properly entitled "Theory and Applications of Phosphorus-31 NMR to Biochemistry." One could have expected a more straightforward indication of this emphasis in the title of the monograph. The organophosphorus chemist concerned with reactions and reaction mechanisms of phosphorus compounds in general may feel somewhat disappointed in the contents. Although the book may lack general appeal in this regard, it clearly addresses the important and growing applications of phosphorus NMR to biochemistry and medicine. It appears not unlikely to this reviewer that the field of whole-body and tissue studies will come to dominate much of the ^{31}P-NMR literature in the coming decades, perhaps requiring still more specialized monographs in future. However, the organophosphorus chemist as well as the biochemist cannot afford to be without this carefully researched and well-produced volume. There is a great deal of carefully documented research summarized in the reviews covered, much of it of very broad interest to the organic chemist. The volume is extremely well illustrated. There are diagrams, tables and sample spectra on nearly every page. The book has been well made and is easy to read. The editor deserves much credit for a needed, useful volume put together with evident care.

M. Grayson
Cos Cob

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Also Received

Chemistry Reviews, Volume 6. Soviet Scientific Reviews/Section B, M. E. Vol'pin, ed., ISBN 3-7186-0139-7, Harwood Academic Publishers, New York, 452 p., $170.00.

Contains reviews of Soviet organophosphorus chemistry. Chapters are as follows: Investigations of Cyclic Phosphorus Derivatives, by B. A. Arbusov, N. A. Polezhaeva and R. P. Arshinova; Reactions of Phosphorus Monothio, Monoseleno, and Selenothio Acids with Aliphatic Diazo Compounds, by T. A. Mastryukova and M. I. Kabachnik; Organic Derivatives of Phosphorus Iodides, by A. V. Kirsanov, N. G. Feshchenko and Zh. K. Gorbatenko; Reactions of α,β-Unsaturated Derivatives of Trivalent Phosphorus Isocyanates and Substituted Methylenamides with Electrophilic Compounds, by A. N. Pudovik and I. V. Konovalova; Synthesis and Investigation of the Properties of Two-Coordinate Phosphorus Compounds, by L. N. Markovskii, V. D. Romanenko and A. V. Ruban; Anionic Complexes in the Nucleophilic Phosphorylation of Aromatic Compounds, by Yu. G. Gololobov and P. P. Onys'ko; Phosphorylation Reactions with the Use of Condensing Agents in Oligonucleotide Chemistry, Intermediate Compounds and Intermediate Reactions, by D. G. Knorre and V. F. Zarytova; and Cyclic Phosphites and Cycloamido Phosphites of Carbohydrates, by E. E. Nifant'ev and M. P. Koroteev.