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Book Review

d-ORBITALS IN THE CHEMISTRY OF SILICON, PHOSPHORUS AND SULFUR (Vol. 3 of "Reactivity and Structure Concepts in Organic Chemistry") by H. Kwart and K. G. King, Springer-Verlag, Berlin/Heidelberg/New York, 1977, VIII + 220, \$39.60.

The basic purpose of this book by Kwart and King is to present a critical examination of the role of d-orbitals in silicon, phosphorus, and sulfur chemistry.

The book sets out with an essentially traditional discussion of the geometries, sizes, and energies of d-orbitals. Following this is a section dealing with alternatives to $d\sigma$ and $d\pi$ bonding, including valence shell electron pair repulsion theory, and the three-center four-electron bonding model. Some useful references to more sophisticated molecular orbital treatments are also provided.

Chapter III is concerned with a discussion of physical properties such as bond lengths, bond angles, and various spectroscopic data and their use to invoke or refute $dp-\pi$ bonding. A very useful feature of this (and the next two chapters) is the use of extensive tabulations of the various systems, together with references and the conclusions reached. In Chapter IV the effect of $dp-\pi$ bonding on chemical properties is examined.

Almost a third of the book, and most of the final chapter, is concerned with the isolation, inference, or synthetic applications of pentacoordinate species. The main thrust of the discussion here is mechanistic and there is only minor mention of the role of d-orbitals from page 121 onward. This section will therefore be of primary interest to those concerned with the organic chemistry of silicon, phosphorus, and sulfur.

By and large the authors have been successful in exploring their basic theme. Furthermore, the book is well organized from a bibliographic standpoint. One of the major and obvious problems in examining the role of d-orbitals in main group chemistry is that the field is expanding very rapidly.

C46

Inevitably, some important articles on the subject have not been included. In fairness, however, it should be pointed out that the authors have added an appendix dealing with a selection of recent (1977) results.

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