

Book Reviews

Ylides and Imines of Phosphorus

A.W. Johnson (with special contributions from W.C. Kaska, K.A.O. Starzewski, and D.A. Dixon), Wiley Interscience, pp. 583, £74
ISBN 0-471-52217-1 (Alk. paper)

The senior author published an important monograph on ylide chemistry in 1966, which was comprehensive and covered the literature with 840 citations. The present volume is, in one sense, its successor, but it centres exclusively on the ylides and imines of phosphorus. The field has obviously grown very substantially, this more limited scope being covered in 587 pages with over 3000 references. Moreover, as Professor Johnson points out, this time the coverage is selective rather than complete, although an effort has been made to be "encyclopedic" without necessarily citing all examples of every reaction.

Professor Johnson is the author of all but two chapters. There is a useful one (Chapter 2) on theoretical aspects by D.A. Dixon, while another (Chapter 14, by W.C. Kaska and K.A.O. Starzewski) deals comprehensively and effectively with transition metal complexes of ylides. The latter topic is covered in 73 pages and cites 239 references. It is, of course, this chapter which will be of particular interest to many readers of this Journal because it is devoted to the formation, structures and reactions of compounds having transition metal to carbon bonds. It contains sections dealing with (a) Ti, Zr, Hf (8 pages); (b) V, Nb, and Ta ($2\frac{1}{2}$ pages); Cr, Mo and W (12 pages); Mn and Re (6 pages); Fe, Ru, Os (9 pages); Co, Rh, and Ir (4 pages); Ni, Pd, and Pt (11 pages); Cu, Ag and Au (6 pages); and the f-metals (7 pages).

The titles of the remaining chapters together with (in parentheses) the number of pages and references, respectively are as follows: Introduction to Ylides and Imines (8, 41); Introduction to Phosphonium Ylides (43, 432); Preparation of Phosphonium Ylides (20, 228); Reactions of Phosphonium Ylides I. Cleavages and Decompositions (19, 105); Reactions of Phosphonium Ylides II. With Electrophilic Reagents (33, 214); Reactions of Phosphonium Ylides III. With Multiple-Bonded Compounds and Three-Membered Rings (23, 135); The Wittig Reaction I. Scope and Applications (41, 354); The Wittig Reaction II. Mechanism and Stereochemistry (26, 100); Phosphonate Carbanions (Phosphono Ylides) (39, 390); Phosphinoxy Car-

banions (Phosphono Ylides) (19, 128); Other Phosphorus Ylides/Carbanions (15, 81); and Iminophosphoranes & Related Compounds (62, 599).

The book is attractively produced with numerous equations, reaction schemes, diagrams and tables, and is obviously essential reading for researchers in this important area.

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Macmillan's Chemical and Physical Data

A.M. James and M.P. Lord, The Macmillan Press Ltd., London and Basingstoke, 1992, pp. 565 + xxv, £35
ISBN 0-333-51167-0

The major data handbooks for chemists (such as the Rubber Book and Lange's Handbook of Chemistry) have been going for so long, with their continuous updating, that it takes a very bold publisher to challenge them. Macmillan's have now produced a "compact and affordable" data book, and it is necessary to ask whether it has advantages over its long-established competitors. It claims to be up-to-date, reasonably but not 100% authoritative in terms of the data presented, easily accessible, and different from existing handbooks. I have tried to compare it with Lange's Handbook to establish just how different is really is.

It starts with Units, Conversion Factors, and Fundamental Constants, and it is good that SI and IUPAC recommendations are used throughout. Lange has a similar section. Then Properties of Materials are treated, listing densities, elastic moduli, viscosities etc. Not all of this is to be found in Lange. Next comes properties of the elements, with electronic structures, physical properties, crystal structures, ionisation energies, and electronegativities. Lange probably contains more, but dispersed. There follows General Properties of Molecules, with structural data (bond lengths and angles), shapes, dipole moments, character tables and crystal data. These are very much summaries, and the same material is in Lange.

The next section is Electricity and Magnetism. The magnetic and dielectric properties seem more exten-

sively presented than in Lange. Electrochemistry covers a range of topics including properties of solutions, such as osmotic pressures, pH, indicators, redox potentials, acid dissociation constants *etc.* Again, this is all generally in Lange, but rather more dispersed. Then comes Optics, though this would be better described as optical properties. This seems generally more detailed than Lange. It overlaps in many ways with Spectroscopy, which gives calibration frequencies, IR windows, chemical shifts, characteristic resonances, and even typical mass spectral ions. These are useful sections.

Atomic and Nuclear Physics contains an extensive table of the properties of nuclides, and Acoustics is a short section which seems a little inappropriate. The Physical Properties of Inorganic and Organic Compounds is based on the Dictionary of Inorganic Compounds and the Dictionary of Organic Compounds. Both lists are reminiscent of other handbook compilations, but they seem to be a bit less extensive. However they include hazard data and references to spectral data. In addition, organometallic compounds, amino acids, carbohydrates, steroids, polymers, and gases, and some supplementary data are tabulated separately.

The compendium concludes with Heat and Temperature (rather too physical in content for my taste), Thermodynamic Properties of Elements and Compounds (excellent, extensive, and useful), Astronomy and Geophysics (!), Chemical Kinetics (a somewhat selective compilation) and Health and Safety (or rather toxicity and hazards of chemical substances). This last is very useful.

At the end, I feel it difficult to make a firm recommendation in comparison with the established handbooks. However, the data are grouped in a new way, which make them accessible, most of the data are of chemical value rather than of general interest, and very full references are given so that all the data can be checked and more obtained. There are several unique features which make this book particularly useful. I think it a very valuable addition to the literature, and it should get even better as it is refined in subsequent editions. Certainly it is at least comparable in quality and coverage to the competition. It should be available in all reference libraries and it is cheap enough to justify personal copies.

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Energetics of Organometallic Species

J.A. Martinho Simões (ed.), NATO ASI Series, Mathematical and Physical Sciences, Vol. 367, Kluwer Academic Publishers, Dordrecht, 1992, pp. 492 + xii, USD 129, Dfl 215, £75
ISBN 0-7923-1707-6

Normally I do not react favourably to books which result from conferences or courses. The reviews are often incomplete and the material is generally easily available elsewhere. However, in this case I have to make an exception, because I found this book exceptionally interesting.

Thermochemistry is a very elevated art whose products are often misunderstood and misused. This book provides some excellent and informative reviews covering many aspects of organometallic thermochemistry. The introductory chapter is by the pioneer of organometallic thermochemistry, H. Skinner, and the following chapters discuss problems and applications of combustion calorimetric data, especially in the context of hydrocarbon activation. Then consideration is given to other techniques for establishing enthalpies and bond strengths, such as photoacoustic calorimetry, electrochemical techniques, rotating aneroid combustion calorimetry, and kinetic methods. There is also discussion of general principles – how constant is enthalpy of a given bond type in a range of compounds? The answer appears to be: it all depends. There is considerable emphasis on gas-phase studies, mainly using forms of mass spectrometry, which give data on metal–hydrogen bonds as well as metal–carbon. Finally there are some theoretical and computational reviews.

This book appeals to me strongly. It contains a wide range of reviews, data, and references. It concerns various types of metal–carbon bonds in transition metal as well as main group metal compounds. The editor admits to a certain unevenness in the formalisms used but this is not a tremendous handicap. The book needs to be read in small sections, not all at once, and seems to be a good source of data. It should be of value to anyone interested in the energetics of organometallic compounds and their reactions.

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