

Book Reviews

Metal-to-Metal Bonded States of the Main Group Elements

By M. J. Taylor, Academic Press, London, New York, San Francisco. Price: £5.80. Number of pages: 211.

The presence of metal to metal bonding in inorganic molecules has always attracted the interest of inorganic chemists. Over the last decade the number and extensive nature of this range of compounds has become appreciated. Much of the current work reported in the literature is concerned with transition metal complexes, and this book provides an admirable survey of the complementary chemistry of the main group elements. Complexes formed with the transition elements and main group metals are included in the survey and provide a useful bridge between the two fields.

The book covers well the literature up to the end of 1973. The text is well written and the detailed coverage of the subject matter is good. For a book of this length, a certain degree of selection has been inevitably made, but the main approach has been to cover the salient features of the chemistry and review critically the various physical techniques available for the detection and determination of metal-metal bonding in molecules.

As a worker with interest in this field, I can recommend this text as a good introductory survey that should prove of benefit to both the undergraduate advanced classes and provide a good general background for the researcher in inorganic chemistry.

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Inorganic Chemistry of the Main-group Elements - Vol 2

Chemical Society specialist Periodical Report:
Senior Editor C. C. Addison

The London Chemical Society's Specialist Periodical Reports provide one of the most convenient and satisfactory ways of maintaining contact with the literature in specific fields. The present volume of 726 pages covers the literature from September 1972 to September 1973 and is divided into eight chapters beginning with the alkali metals and ending with the noble gases.

Although primarily devoted to strictly inorganic compounds those with metal to carbon bonds receive quite extensive coverage, and among the notable features to this review are the large numbers of illustrated crystal structures that are included, and the large number of references to Russian work. The presentation of each chapter is excellent with extensive use of sub-headings, tables and structural formulae. The author index occupies 42 pages.

This book can be very strongly recommended to all inorganic chemists.

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Growth of Crystals from the Vapour

By M. M. Faktor and I. Garrett, Chapman and Hall, London. Price: £7.00.

This book is an attempt at linking all the different aspects inherent to the science of crystal growth from the vapour in a final synthesis after having separately deepened each of them in five monographic chapters. As is known, crystal growers come from a variety of fields: chemistry, physics, electronic engineering, chemical engineering. This book may assist new workers in entering the field because it includes under one cover relevant concepts and information disseminated in the textbooks of a variety of disciplines: hydrodynamics, surface chemistry, thermodynamics, crystallography and inorganic chemistry.

For some topics as thermodynamics and crystallography long accounts are given starting at first principles, because these subjects are central to crystal growth and are well developed. The coverage of other subjects, on the contrary, such as surface chemistry, is scant. This fact may be justified not because these subjects are less important but because they are in a comparatively primitive state of development.

The subject matter of this book was not placed in an entirely logical manner but rather in a pragmatic one. For example the chapter on Experimental Methods is placed as the penultimate chapter because it is considered by the authors as a point of arrival of the book, *i.e.* as the synthesis and the application of all the previously treated theoretical principles. In this way the design and the modification of the apparatus and the choice of the optimum conditions

for growth are best understood, but the reader must be patient for five chapters in order to see all the physical and mathematical concepts previously developed made concrete. In conclusion, while the first five chapters may appear a little disconnected from each other owing to their admittedly monographic treatment and to their being not always performed at the same level, the last two are very interesting for a research worker in this field.

This is mostly true for the last chapter where many open questions are discussed and some suggestions for new directions of research work in crystal growth from the vapour are given.

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The Structural Chemistry of Phosphorus

by D. E. C. Corbridge, Elsevier, Amsterdam, 1974.
Price Dfl. 250.0.

Dr. Corbridge, a leading X-ray crystallographer, is to be congratulated on his remarkable industry and application in compiling a reference work of this kind. The text occupies some 425 pages, with an additional appendix of 47 pages devoted almost entirely to unit cell and space group data. This is followed by a list of 2649 references which gives some idea of the literature coverage.

Phosphorus chemistry is a subject which has expanded enormously in the past 20 years and the recent advances, due in large part to the application of modern experimental techniques, are truly remarkable. Naturally structural determinations have played a major rôle in this subject, providing a sound basis for both theoretical and reactivity studies. "Structure" means different things to different people, and on approaching this book one feels that, as it is largely devoted to X-ray work, although i.r. and Raman spectra are quoted widely in parts, the title is something of a misnomer. A reader who is looking for a general theoretical account of the fascinating structural problems which have been tackled recently, or to the application of advanced nmr techniques to structure problems is likely to be disappointed.

The appeal of this work is largely to the inorganic chemist, interested in inorganic phosphates, poly-

phosphates and related systems, including organometallic complexes. These compilations and the chapters on phosphonitrilic compounds, phosphides and elemental phosphorus are excellent. The structural diagrams are superb and the Tables of bond lengths impressive. Several chapters commence with, or include, brief accounts of the theoretical basis of the structures of the simpler compounds considered.

Thus pp. 292-298 are devoted to 5-coordinated phosphorus, a subject of considerable contemporary interest. One feels that the treatment is hardly adequate. Five-coordination is a particularly important area of phosphorus chemistry in view of the wide range of substituents which can be used. Although structures other than the common bi-pyramidal one are mentioned and some spectroscopic evidence favouring C_{4v} square pyramid structures is quoted, it is a pity that the author did not discuss this area in more detail. It is surprising that the several X-ray structures of compounds with C_{4v} symmetry are not included, presumably because the literature survey was completed up to 1972. In view of the enormous cost of the book however, one feels that the author could have included more footnotes, drawing attention to the more important structural advances of 1973-4.

Similarly the introduction to Ring Molecules (Chapter 14), although clearly presented, hardly does justice to a structural area of phosphorus which has expanded rapidly in the past ten years. The examples which follow are fully representative of the most important heterocycles and this chapter will be of interest to organic chemists.

Planning and writing a monograph in a rapidly expanding subject is particularly difficult in this day and age. It is impossible to attain a balance which satisfies all readers, and a considerable amount of selection is necessary. The author has almost achieved this balance for the inorganic chemist, and the book is a useful source of information for all those interested in phosphorus compounds. The book is beautifully produced, but I fear that the price will preclude it from most private collections, and regrettably from some libraries in the present stringent economic times.

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