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Book Review

Progress in Inorganic Chemistry, K.D. Karlin (ed.), vol. 47, Wiley Interscience, New York, 1998, pp. vi + 978, GB£125.00, ISBN 0-471-24039-7.

This latest volume in the acclaimed series contains eight reviews by expert authors, on a wide range of topics that emphasises the enormous scope of modern inorganic chemistry. It is unlikely that any one reader will be informed enough in all the fields covered to give an authoritative verdict on the book as a whole, which really confirms that this kind of production is primarily for reference and aimed at the library market. It is likely that many people will find parts of it extremely valuable.

The first, extensive review in this volume is by Gerard Parkin, on terminal chalcogenido complexes, otherwise complexes with metal-chalcogenide double bonds. The emphasis is on the heavier chalcogens, selenium and tellurium, but a lot of the discussion concerns oxygen, which may or may not be a chalcogen, depending upon individual preference. One learns surprising details. For example, although titanium is reluctant to form double bonds to oxygen, 13 examples have been structurally characterised, but there are none so characterised with double bonds to S, Se, or Te. Vanadium exhibits 399 examples of structurally characterised V=O systems. In fact if oxygen had been omitted from this review, it would have been brief indeed, even though the author covers the whole Periodic Table. Of course, this is an area that Parkin has in many ways made his own. With over 350 references, the review seems to be comprehensive. At the same time it evaluates the literature data critically. This is a service that reviewers with easy access to computerised data bases sometimes fail to provide.

A review by Christopher Cummins on three-coordinate complexes of hard ligands in many ways complements the Parkin review. The complexes he discusses often go four-coordinate to produce materials with double bonds to oxygen and sulfur, and the most interesting recent example of this kind of behaviour is from Cummins himself, who described the formation of a nitrido complex directly from dinitrogen. This long review, with over 200 references, would have made a complete, short book itself not so long ago. However, it restricts itself to mononuclear complexes of 'hard' (sic) ligands, and thus excludes consideration of species of the later transition metals with ligands such as phosphines. Even with this restriction, the review is balanced and informative.

It begins with a short description of orbital energy levels, and then presents a detailed discussion of three-coordinate compounds, their syntheses, structures and reactivities. Most of this systematic treatment deals with the elements of Groups 4, 5, and 6, an area to which the author has made significant contributions, and it also extends as far as Group 10. This is a valuable review that will be much consulted, though few will want to read it at one sitting.

The other reviews, which I am less qualified to comment on, are as follows: Coordination Chemistry of Cryptands, by Nelson, McKee and Morgan; Metal-phosphonate Chemistry, by Clearfield; Oxidation of Hydrazine in Aqueous Solution, by Stanbury; Metal Ion Reconstituted Hybrid Hemoglobins, by Venkatesh, Rifkind and Mancharan; and Metal–Carbohydrate Complexes in Solution, by Verchère, Chapelle, Xin and Crans. The editor has been catholic in his selection of reviewers, and the result is a volume that will be of interest to a very diverse readership.

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