

Book review

Transition metal clusters, edited by B.F.G. Johnson, John Wiley and Sons, Inc. Chichester/New York/Brisbane/Toronto, 1980, 681 pages, \$ 96.50.

The field of transition metal cluster chemistry is, at present, an important one which is receiving much attention in academic as well as in industrial laboratories. A broad summary of this area is timely and welcome, now that a large body of published work, much of it quite recent vintage, exists on the synthesis, structure, bonding and chemical reactivity of transition metal clusters. To write this book, B.F.G. Johnson enlisted the services of seven English chemists and one physicist. Overall, the result is quite satisfactory.

After the first chapter, a brief introduction by the editor, P.R. Raithby surveys the structures of metal clusters (by Periodic Groups, from IVA through IIB). This chapter makes for somewhat awkward study since its indispensable 156 figures are all collected at the end of the chapter's textual material. Some of these figures are the usual three-dimensional representations found in structural papers. Others apparently were drawn by the author and these are not always successful in representing the structure. For instance, Figure 140 does not reproduce the structure very well as it is described in the text on p. 83.

A chapter on bonding and electron counting in metal clusters follows and that K. Wade, who has been so instrumental in the development of this subject, is the author is no surprise. Wade has reviewed this subject before, but perusal of the list of references shows many from the literature of 1977—1979 which antedate his 1976 review. This will be a very useful chapter for anyone working on cluster complexes.

The fourth chapter, by C.D. Garner, covers cubane-type clusters. Although these in general are heteronuclear in nature often containing both transition metal atoms and nonmetal atoms, this class of clusters contains some important members and is not out of place in this book.

Metal—metal bond enthalpies in clusters are the subject of the fifth chapter by J.A. Connor who has himself been active in this area. Since not much work has been done on this subject, the chapter is a short one.

To those interested in reaction chemistry, the sixth chapter, by A.J. Deeming, will have the greatest appeal since it deals with the reactions of metal clusters. These are of diverse types; simple additions to clusters; additions and eliminations with cluster reforming vs. substitution; oxidative addition; bond cleavage in ligands; other reactions related to catalysis are the major section headings. This is a well-organized and interesting chapter. Related to Deeming's chapter are the seventh, by the editor and R.E. Benfield, on ligand mobility in clusters, and the eighth, by R. Whyman, on metal clusters in catalysis. The latter chapter is a tricky one since, as the author points out in his introduction, "there is really no unequivocal example of catalysis by a cluster compound". The problems of this aspect of cluster chemistry are well delineated.

The final chapter, by R.G. Wooley on electrons in transition metal cluster carbonyls, is aimed at those who are more theoretically inclined and will be of little use or interest to the synthetic chemist.

This book has a combined key word and formula index. It consists of photoreproduced typescripts which have generous spacing between lines, therefore the 681 pages. We have here a good case of "page inflation" and must conclude that, under the circumstances, the price is outrageous.

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