removed from my main interests. It is the type of work you want to see in your library; you hope too that your library will be able to continue to take the new volumes as they appear. However, these books are expensive and even libraries—let alone individual purchaser—will find the price high.

This reviewer recommends this volume (and others in the Organophosphorus series) and hopes that it obtains the sales it deserves.

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Metals and Ligand Reactivity

E. C. Constable
2nd edn, VCH, Weinheim, 1996
308 pages DM 68.00 (paperback)
ISBN 3-527-29277-2

The back cover of this book proclaims: 'This book is a highly readable introduction to the reactions of co-ordinated ligands, which have become a useful tool in organic synthesis. Bridging the gap between the traditional fields, this text presents the basic concepts of ligand reactivity as well as synthetic applications of these reactions.'

What are we to make of this?

The book is certainly readable and I enjoyed my first couple of hours with it. However, the choice of material will not generally be to the liking of readers of *Applied Organometallic Chemistry*, as the book is only concerned with Wernerian co-ordination compounds, and even within that category there is an emphasis on ligands with nitrogen donor atoms.

The book is divided into ten chapters. The first two introduce the concepts of co-ordination chemistry and describe the metal–ligand bond. Chapters 3 and 4 are concerned with nucleophilic attack on co-ordinated ligands, while Chapter 5 discusses electrophilic attack. Chapters 6 and 7 were for me the most interesting in the book and deal with the template effect, both for conventional macrocycles and encapsulating ligands. This leads on to supramolecular chemistry and there is much good modern material in these two chapters. Chapter 8 is concerned with reactions of co-ordinated aromatic and heterocyclic ligands, but -complexes are excluded. The subject of Chapter 9 is oxidation and reduction of co-ordinated ligands, and the final chapter is a very brief survey (11 pages) of co-ordination compounds in biology.

On page 1 of the book, Professor Constable gives his definition of a co-ordination compound. This is rather like an architect defining a building. His definition is a compound 'formed by the interaction of a molecule containing an empty orbital with one that possesses a filled orbital'. Well, there aren't many compounds not included by that! HCl for one. My own preferred definition is based on Moeller's *Inorganic Chemistry* (Wiley, 1952) ... 'formed by combinations of apparently saturated materials which are capable of independent existence'.

As I have said, I enjoyed reading this book, but I could not help wondering for what type of reader it is intended. The outlook seemed a little restricted at times, and the omission of organometallic compounds is hard to justify, given the title the author has chosen. Even within the context of co-ordination compounds one might have expected to find an explanation for the attempted synthesis of $[Fe(P(CH_3)_3)_5]$ giving a hydridoalkyl by oxidative addition, and I looked in vain for the chemistry of co-ordinated pyridoxal, which was one of the first examples of co-ordinated ligand reactivity to be studied. As for organic synthesis, I did not find much mention of that other than the template reactions producing ligands. The back cover also refers to numerous study problems, but I did not find any in my copy.

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Catalysis by Metal Complexes
Vol. 19: Oxygenases and Model Systems

Takuzo Funabiki (Ed.)
Kluwer Academic Publishers, Dordrecht, 1996
393 pages. £129 hardback
ISBN 0-7923-4240-2

Most of the dioxygen molecules exploited by aerobic organisms are utilized for the production of energy, i.e. dioxygen is used as a terminal electron acceptor, being reduced to water, in order to drive oxidative phosphorylation. However, a small amount of dioxygen is used directly in the synthesis and degradation of many of the chemical constituents of the cell. The enzymes which catalyse these reactions are termed oxygenases. These enzymes (termed mono-oxygenases and dioxygenases) insert either one or two atoms of oxygen into a substrate, respectively. It is these enzymes and their model complexes which form the focus of this book.

With several contributors providing the eight chapters which make up this volume it is perhaps not surprising that there is a certain variation in quality. In general, though, the subject is covered in considerable depth and thoroughness and the editor deserves much credit for this. The book opens with a brief, but useful, introduction to the enzymes in question as well as to the mimetic chemistry involved in producing models of the relevant active sites. With the scene suitably set, the next chapter describes dioxygenases; this is, in my opinion, by far the best section of the book. The different enzymes which make up the dioxygenases are described in admirable depth with clear descriptions of catalytic mechanisms and active-site structures. For anyone interested in these enzymes this chapter will make a valuable reference source and the thoroughness of the coverage is backed up by nearly 400 references. The same author then makes a

similarly good job of iron-based model studies of the dioxygenases, with a worthy description of various model compounds and proposed mechanisms of oxygenation. This is complemented by the fourth chapter which covers all the non-iron model complexes for dioxygenase activity.

Chapter 5 on cytochrome *P*-450, however, is a little bit of a disappointment. The cytochromes *P*-450 are a vast class of enzymes with many hundreds of examples known. These mono-oxygenases use the same basic chemistry to catalyse the oxygenation of a huge variety of compounds. There is an intense research effort throughout the world on these enzymes from both prokaryotic and eukaryotic sources and high-resolution crystal structures have been determined for four different cytochromes *P*-450. I had expected therefore that this chapter would contain a similar level of detail as chapter 2 for dioxygenases. Unfortunately this was not the case; in fact, this is one of the shorter chapters in the book. Cytochrome *P*-450cam (the enzyme from *P. putida* which converts camphor to 5-*exo*-hydroxycamphor) is the most studied of all the *P*-450 enzymes and not surprisingly this is the *P*-450 described in this section. The chapter focuses almost entirely on the mechanism of oxygen activation by *P*-450cam. This is fair enough, I suppose, but for a reader wishing to learn more about these enzymes it might have helped to have more detail on the variety of *P*-450s and their range of substrates. The actual description of oxygen activation by *P*-450 is quite good, and the coverage of the role of certain active-site residues in catalysis is also well presented.

Following on from *P*-450 is a chapter on model studies of haem mono-oxygenases. This covers most aspects of synthetic haem models for *P*-450-like activity, including the formation of oxyferryl porphyrin -cation radical species analogous to the so-called compound I seen in catalases and peroxidases. This is a worthy chapter with good diagrams of the various metalloporphyrin models and an extensive reference list.

Chapter 7 is concerned with non-haem mono-oxygenases. These are a fascinating group of enzymes and one of the most interesting is methane mono-oxygenase. This enzyme uses oxygen to convert methane into methanol. The properties and mechanism of action of the enzyme are described in detail and there are useful tables and figures which summarize the various organic compounds on which methane mono-oxygenase can act. The copper-containing mono-oxygenases, tyrosinase and dopamine-β-mono-oxygenase, are briefly described towards the end of this chapter. The book closes with a section on chemical models for the non-haem iron and copper mono-oxygenases.

So what is the overall verdict? In many ways reading this book can be a little irritating: the tenses seem to chop and change, and plurals and singulars appear to be used randomly at times, particularly in certain chapters. This is however a very minor criticism. In fact, some of the chapters are really excellent and on balance one has to say that the volume is well put together. The other nice thing worth mentioning is that the book has just the right mixture of chemistry and biology to make it of interest and of value to chemists and biochemists alike. I am sure that both groups will find it extremely useful as a reference text. I would, therefore, recommend that anybody working in the field should get hold of it, or at least make sure their library has a copy.

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Gmelin Handbook of Inorganic and Organometallic Compounds

Series editors: U. Krüerke, C. Siebert and B. Woebke

Part 6. Germanium-Fluorine Compounds and Triorganogermanium Chlorides

P. Mazerolles, C. Siebert and B. Woebke
Springer-Verlag, Berlin, 1996, 8th Edn.
260 pages. £658.50
ISBN 3-540-93730-7

This volume is devoted to organogermanium fluorides of all types and to triorganogermanium chlorides (R_3GeCl, R_2RGeCl, RRRGeCl and germacyclic compounds); the literature is covered to the end of 1994. Like earlier volumes in this series, it is logically structured: data on given types of compounds appear in tables, each of which is followed by general remarks and, where appropriate, supplementary data on individual compounds. Separate tables/diagrams are devoted to such things as vibrational- and mass-spectroscopic data. Each section ends with a list of references, arranged in order of year of publication and alphabetically by author within each year, making it very user-friendly. In addition an invaluable empirical formula index is included at the end of the book.

This, again like all earlier volumes of Gmelin, is a book all university libraries should possess, but regrettably the very high price will make this impossible.

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Main Group Elements and their Compounds

V. G. Kumar Das (ed.)
Springer-Verlag, Heidelberg, 1997
525 pages. £83
ISBN 3-540-61425-7

This book is largely the outcome of the International Conference on Materials Science and Environmental Chemistry of Main Group Elements organized by the Asian Network for Analytical and Inorganic Chemistry (ANAIC) under the chairmanship of Professor Kumar Das in Kuala Lumpur, Malaysia, in November 1993. It