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## Book reviews

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*Comprehensive Coordination Chemistry*. (Editor in Chief, G. Wilkinson; Executive Editors, R.D. Gillard and J.A. McCleverty.) Pergamon, Oxford etc. 1987. In seven volumes. £1600.00; US \$2450.00. ISBN 0-08-026232-5.

After the success of the excellent series of volumes on *Comprehensive Organometallic Chemistry* this companion series was awaited with much interest. The impression I have formed after consulting a range of inorganic chemists whose opinions I respect is that the overall view is that it does not come up to the standard of the earlier series but is nevertheless a valuable addition to the literature, and should be in all chemical libraries.

The editors faced the problem of the extent to which organometallic compounds should be included, and came up with the arbitrary and unsatisfactory decision to exclude “any species where the number of metal–carbon bonds is at least half the coordination number of the metal”. The unreality of this distinction, along with some other aspects of the volumes, raises again the issue of whether there is any justification for continuing to treat coordination chemistry as a distinct entity, though one would have thought that the answer had been definitively given in their authoritative textbook by Cotton and Wilkinson, who in dealing with the issue of whether there is any justification for treating coordination compounds as a separate class, distinct from molecular compounds, wrote: “on the basis of actual fact (i.e. neglecting the purely traditional reasons for such a distinction) there is very little, if indeed any, basis for continuing the dichotomy”. Would it not perhaps have been better to update and expand the much earlier *Comprehensive Inorganic Chemistry*?

Whatever the doubts about its scope; this set of volumes will be much used. Fortunately the covers and binding are of high quality, but, even so, if the appearance of the volumes of *Comprehensive Organometallic Chemistry* in the library I use is a guide, this new set will look badly battered within a few years.

Reviews of individual volumes appear below.

*School of Chemistry and Molecular Sciences,*  
*University of Sussex, Brighton BN1 9QJ (Great Britain)*

**Colin Eaborn**

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*Comprehensive Coordination Chemistry, Volume 1, Theory & Background*, xiii + 613 pages, ISBN 0-08-035944-2.

This volume follows the established pattern of the earlier “*Comprehensive Treatises*” in chemistry from the Pergamon Press. It contains seventeen chapters or sections of chapters from as many internationally recognised authorities. Like all such multi-author compendia it has its strengths and its weaknesses. It opens with an

over-condensed historical survey followed by chapters covering generally structures and shapes of coordination compounds. Then follows a very condensed, but useful chapter on nomenclature, chapters on cages, clusters (but with no mention of the extensively studied osmium clusters), isomerism, and ligand field theory. This is followed by sections on reaction mechanisms, substitution, electron transfer, photochemical reactions, and reactions in the solid state. There is amongst these a section on reactions of coordinated ligands which gives a well organised, useful and interesting account of changes in the reactions and activity, mainly of organic molecules brought about by coordination to a metal. Nevertheless it makes no mention of the remarkable activation of ligating molecular nitrogen at appropriate metal sites. Finally there are useful and easily read chapters on the electrochemistry of complexes in aqueous and non-aqueous media, the quantitative aspects of solvent effect and the application of coordination chemistry to analysis. The volume has extensive formula and subject indexes.

In general these are a series of excellent reviews, their main flaw being a lack of comprehensiveness owing to shortage of space as most authors explain. Nevertheless the more experienced ones lead the reader in through an extensive but brief summary of what they have left out accompanied by pertinent references. Others, less helpfully, give a few references to "other reviews" then get into their own review. The historical sections have suffered severely, omitting the real things of history, the antecedents to the various phases of interest and growth, the main personalities involved, why transition metal chemistry blossomed immediately after World War II, etc. Much of the post 1925 work of the great European schools is scarcely mentioned, the Scandinavian work on stability constants and Schwarzenbach's complexones, for example. There is no mention of W. Hieber or W. Reppe, yet Reppe's work on the carbonylations, and cyclisations, etc., of olefins and acetylenes by certain transition metal complexes was of especial historical importance. It aroused the interest of the then rapidly developing petrochemicals industry, so bringing to bear the finance to fuel the spectacular renaissance of inorganic chemistry after World War II, so ably propagated world-wide by R.S. Nyholm; he also gets no mention. J.C. Bailar played a similar role in the U.S.A., but as the author he has probably minimised his role. In places the history is so curtailed as to be misleading. For example, it is said on p. 3 that the structure and bonding in Zeise's salt was not understood until after the discovery of ferrocene (1951-1952), but only the blind adherents of the great Justus von Liebig, who arrogantly denigrated Zeise's competence as a chemist and his conclusion that his salt contained an "oil forming gas" (*Ann.* 23 (1937) 12), could be so misled. Even in the 1930's Dr. F.G. Mann in Cambridge was teaching us, as students, that the ethylene in Zeise's salt occupied one coordination place, and that it was believed that the  $\pi$ -electrons of the olefin served the function of the "lone electron pair" on normal donor atoms. Indeed, although the detailed structure of Zeise's salt was established at about the same time as the discovery of ferrocene it received no input from that discovery.

The text is remarkably free from proof errors, but a few have escaped the proof readers, such as an unbalanced equation, and four lines of the preface, repeated from p. vii on to p. viii.

Having said all of this the book does contain useful reviews, mainly well thought out and a joy to read, from highly respected and authoritative chemists. It is

undoubtedly a useful source book, if not so complete as its title would suggest, and has a place in all comprehensive chemistry libraries.

*School of Chemistry and Molecular Sciences,  
University of Sussex, Brighton BN1 9QJ (Great Britain)*

**Joseph Chatt**

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*Comprehensive Coordination Chemistry, Volume 2, Ligands*; xvii + 1179 pages, ISBN 0-08-035945-0

It is inevitable that comparisons will be made between this series of volumes and the companion "Comprehensive Organometallic Chemistry". Whereas the latter was undoubtedly the outstanding secondary source of information for topics within its scope, the same cannot, I believe, be said for the present volume. The editors have gathered together an impressive group of contributors who are acknowledged experts in their fields; many of them have written reviews on the same topics, although, it must be said, usually at greater length and depth. It is perhaps inevitable that coverage for coordination chemistry would have to be less detailed than that for organometallic chemistry, but in some cases there is even a lack of references to important reviews. More surprising is the fact that individual topics are, in most cases, covered more thoroughly elsewhere.

This volume is organised according to the nature of the ligating atoms, starting with mercury and going on to C, Si, Ge, Sn, Pb, N, O, S, Se, Te, Hal, and H; the concluding chapter deals with P, As, Sb, and Bi, and interposed between this and the H section are a number of chapters dealing with hybrid ligands (referred to as "mixed donor atom ligands"). The Preface to the series indicates that the chapter dealing with phosphorus ligands was not available and would appear elsewhere, and the same information is supplied on the flyleaf. However, it must surely have been the case that the chapter dealing with P, As, Sb, and Bi arrived at a very late stage of production and hence appears as the final chapter. Chapter titles, with authors, are as follows: 11, "Mercury as a Ligand", by P.A.W. Dean (4 pages, 45 refs.); 12.1, "Cyanides and Fulminates", by A.G. Sharpe (7 pages, 47 refs.); 12.2, "Silicon, Germanium, Tin, and Lead", by P.G. Harrison and T. Kikabai (6 pages, 43 refs.); 13.1, "Ammonia and Amines", by D.A. House (36 pages, 898 refs.); 13.2, "Heterocyclic Nitrogen-donor Ligands", by R. Reedijk (22 pages, 174 refs.); 13.3, "Miscellaneous Nitrogen-containing Ligands", by B.F.G. Johnson, B.L. Haymore, and J.R. Dilworth (51 pages, 510 refs.); 13.4, "Amido and Imido Metal Complexes" by M.H. Chisholm and P.I. Rothwell (22 pages, 254 refs.); 13.5, "Sulfurdiimine, Triazenido, Azabutadiene, and Triatomic Hetero Anion Ligands", by K. Vrieze and G. van Koten (48 pages, 355 refs.); 13.6, "Polypyrazolylborates and Related Ligands", by A. Shaver (12 pages, 69 refs.); 13.7, "Nitriles", by H. Endres (6 pages, 39 refs.); 13.8, "Oximes, Guanidines, and Related Species", by R.C. Mehrotra (18 pages, 261 refs.); 15.1, "Water, Hydroxide, and Oxide", by J. Burgess (15 pages, 228 refs.); 15.2, "Dioxygen, Superoxide, and Peroxide", by H.A.O. Hill (15 pages, 187 refs.); 15.3, "Alkoxides and Aryloxides", by M.H. Chisholm and I.P. Rothwell (23 pages, 303 refs.); 15.4, "Diketones and Related Ligands", by A.R. Siedle (37 pages, 639 refs.); 15.5, "Oxyanions", by B.J. Hathaway (19 pages, 133 refs.); 15.6, "Carboxy-