

Book Reviews

Multiple Bonds Between Metal Atoms

F.A. Cotton and R.A. Walton, Oxford University Press, 1993, pp. 787 + xxii, £70
ISBN 0-19-855649-7

This is the second and substantially revised edition of a book which was first published in 1981. In one sense the title is a misnomer, since the chemistry covered is entirely concerned with transition metals.

The authors are, of course, extremely well known for their many contributions to chemistry, not least to this field. The initial impetus for interest in the area was probably the recognition by F.A. Cotton in the early 1960s of a then new type of bonding between the Re atoms in the ion $[\text{Re}_2\text{Cl}_8]^{2-}$. It was with this discovery that the notion of quadruple bonds became part of the language of inorganic chemistry.

The authors point out that since the appearance of their first edition the number of publications dealing with this topic has far exceeded that referred to originally. This will be recognised in part by the size of this book (787 pages + a 15 page subject index).

The chapter headings, with the number of references shown in parentheses, are as follows: "Introduction and survey" (62); "Multiple bonds in dirhenium and ditechneum compounds" (357); "Multiple bonds in dimolybdenum and ditungsten compounds" (468); "Multiple bonding between chromium atoms" (112); $\text{X}_3\text{M}\equiv\text{MX}_3$ Compounds of molybdenum and tungsten" (184); "Diruthenium and diosmium compounds" (119); "Dirhodium compounds" (397); "Dimetal compounds of other Group VIII elements, Co, Ir, Ni, Pd, Pt" (155); "Metal-metal bonds in other structural contexts" (606); "Physical, spectroscopic, and theoretical results" (296); and "Postscript on some recent developments" (125).

Most university courses of inorganic chemistry have sections devoted to the problems highlighted by the title of this book. Undoubtedly this volume, which is of very high quality, will be a valuable contribution not only to researchers but also to teachers.

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Transition Metal Carbyne Complexes

F.R. Kreissl (ed.), NATO ASI Series, Volume 392, Kluwer Academic Publishers, 1993, pp. 268 + xii, £76.00
ISBN 0-79-232212-6

This book is a collection of articles by a number of distinguished authors and their coworkers who presented lectures at a NATO meeting held at Wildbad Kreuth in the autumn of 1992. The articles were prepared in camera-ready form from manuscripts.

In many ways this work is a companion to one entitled "Advances in Metal Carbene Chemistry", which presented an account of a similar meeting dealing with that (related) topic four years ago. Both meetings owed their inspiration to students of Professor E.O. Fischer who, of course, was the discoverer of both of these important classes of organometallic compounds.

Carbyne metal complexes date back in the literature to 1973 when a compound of formula *trans*- $[\text{W}(\text{CO})_4(\text{Cl})(\equiv\text{CPh})]$ was described. The field has developed very rapidly, and this can be judged to a significant extent by the fact that many distinguished chemists have contributed to the area and a large number of them are represented by articles in this book.

The principal authors of the 28 articles (comprising 254 pages) are R.R. Schrock, F.G.A. Stone, J.-M. Basset, K. Weiss, K.A.O. Starzewski, M.D. Hopkins, H. Fischer, G.L. Geoffroy, J.M. Moretó, S. Ricart, A.J.L. Pombeiro, L. McElwee-White, Nguyen Quy Dao, C. Krüger, L. Busetto, W.H. Hersh, G. Süss-Fink, W.R. Roper, H.G. Raubenheimer, J.W. Gilje, R.E. Cramer, W. Beck, J.L. Templeton, A. Mayr, F.R. Kreißl, A.F. Hill, and A.C. Filippou.

The subject matter is varied. Much of it is synthetic/structural in character, although there is also emphasis on reactions of carbyne complexes and a good deal related to their role as catalysts. This variety may be illustrated by citing the titles of three articles taken somewhat at random: "Olefin metathesis by well-characterized Re^{VII} alkylidene/alkylidyne complexes" (R.R. Schrock, R. Toreki, G.A. Vaughan and A. Farooq); "Protonation reactions of alkylidyne(carbaborane) complexes of the group 6 metals" (S.A. Brew, N. Carr and F.G.A. Stone); and "Planar

tetracoordinate carbon: experimental determination of the charge density of $\text{Cp}_2\text{Zr}(\mu\text{-}\eta^1, \eta^2\text{-Me}_3\text{SiCCPh})(\mu\text{-Cl})\text{AlMe}_2$ and $\text{Cp}_2\text{Zr}(\mu\text{-}\eta^1, \eta^2\text{-MeCCPh})(\mu\text{-CCPh})\text{AlMe}_2$ " (C. Krüger and S. Werner).

The book will clearly be of interest to workers in the field, although on the whole they will be familiar with much of the data presented. Nevertheless, reviews of this type dealing with a single topic have a useful place in the chemical literature.

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Gmelin Handbook of Inorganic and Organometallic Chemistry, 8th Edition, Organorhenium Compounds, Part 3, Mononuclear Compounds 3
Springer Verlag, Berlin, 1992, pp. 259 + xii, DM 1480
ISBN 3-540-93659-9

This is the third part of the series dealing with organorhenium compounds, the first two parts of which were published in 1989. It discusses the chemical, physical and catalytic properties of mononuclear cy-

clopentadienylrhenium compounds from literature published before the end of 1987, and it is the first of two volumes devoted to this topic. It concentrates on derivatives of NO and of monotertiary phosphines, on monocarbonyls, and on dicarbonyls not containing additional organic ligands.

As is usual in these volumes, the presentation is of the highest class, with full descriptions of structures, spectroscopic properties, and preparative details. For such information one does not need to consult the original literature. The general remarks give some additional data, but cannot convey the flavour of the original discussions.

There is a comprehensive empirical formula index and also a ligand formula index. These enable one to track down any complex easily. What they do not do is give direct access to, say, a general discussion of catalytic properties. This probably won't exist, because of the rigid compound-based structure. Nevertheless, this invaluable book should be within reach of every organorhenium chemist.

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