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Book review

Advances in Organometallic Chemistry, Volume 22; edited by F.G.A. Stone and R. West, Academic Press, 1983, vii + 326 pages, £40.50.
ISBN 0.23.0311224.

This is, of course, the latest in an important series of volumes devoted to timely reviews on aspects of organometallic chemistry. As usual, the contributors are authorities in their fields, and the subject matter of each article is appropriate for an up-to-date survey.

The contents are as follows, and in parentheses are shown the number of pages and references: "The Chemistry of Carbidocarbonyl Clusters", by J.S. Bradley (58 pages, 93 refs.); "Vinylidene and Propadienylidene (Allenylidene) Metal Complexes", by M.I. Bruce and A.G. Swincer (70 pages, 149 refs.); "The Activation of Carbon Dioxide by Metal Complexes", by D.J. Darensbourg and R.A. Kudaroski (40 pages, 142 refs.); "Basic Metal Cluster Reactions", by H. Vahrenkamp (40 pages, 212 refs.); and "Metal Isocyanide Complexes", by E. Singleton and H.E. Oosthuizen (102 pages, 566 refs.). In general, references are to the end of 1982, although in some cases the latter part of 1982 is covered only by addenda; the paper by Singleton and Oosthuizen has just five references to 1982.

Dr. Bradley's chapter is an up-dating of Muetterties' review of 1981 which covered the literature to the end of 1979. Carbidocarbonyls are now known for iron, ruthenium, osmium, cobalt, rhodium, and, most recently, rhenium, and the biggest field is probably that of the iron clusters.

The chapter by Bruce and Swincer deals with compounds in which the ligand may be regarded as $^{-}C{=}CRR'$ or $^{-}C{=}C{=}CRR'$, and each of these is capable of bonding in either a terminal or a bridging fashion. The former ligand in its terminal mode is represented by 74 complexes of the elements Cr, Mo, W, Mn, Re, Fe, Ru, and Os, while terminally-bonded complexes of the latter ligand are reported for 15 complexes of Cr, W, Mn, and Ru. In a bridging fashion, the two ligands are found in 27 complexes of Mn, Re, Fe, Ru, and Co for $^{-}C{=}CRR'$, and 9 complexes of Cr, W, Mn, and Fe for $^{-}C{=}C{=}CRR'$.

The chapter by Darensbourg and Kudaroski covers ground which they have already dealt with (less fully) in a chapter in "Organometallic Compounds: Synthesis Structure, and Theory", ed. by B.L. Shapiro, Texas A & M University Press, 1983. The topics considered are the coordination chemistry of CO_2, insertion reactions of CO_2, and CO_2 reduction and/or incorporation. The treatment is restricted to homogeneous systems. It is perhaps strange that the monograph edited by S. Inoue and N. Yamazaki "Organic and Bioorganic Chemistry of Carbon Dioxide", Halsted Press, New York, 1982, is omitted; this has an excellent chapter by T. Ito and A. Yamamoto dealing with the organometallic reactions of CO_2.

The title of Vahrenkamp's chapter is perhaps a little obscure. The word 'Basic' is used to differentiate those reactions which affect the cluster core from others which are referred to as "external". Thus, the author regards the

title reactions as an extension of metal—metal bond chemistry. The reaction types considered are those of electron transfer, reactions involving uni- or poly-dentate ligands, reactions in which the metal atom composition is changed, and those in which the cluster framework undergoes rearrangement.

Singleton and Oosthuizen's chapter reviews a topic which was last deal with comprehensively by Bonati and Minghetti in 1974, and Treichel in 1973. The large number of references serves as testimony to the great activity in this field. The most notable advance in the last decade may well be that homoleptic complexes are now known for all the transition elements from vanadium, $[V(CNR)_6]^+$, to gold, $[Au(CNR)_2]^+$, with the exception of Nb, Ta, and Tc.

In summary then, this is an extremely valuable addition to the literature.

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