

*Advances in Organometallic Chemistry, Vol. 28*; edited by F.G.A. Stone and R. West, Academic Press Inc., New York, London, 1988, v + 471 pages. £59.50, ISBN 0-12-031128-3.

This is the latest in the well-known series of volumes which, collectively, make for a major secondary source of the organometallic literature. There are seven chapters having the following titles and authors: "Interaction of Ketenes with Organometallic Compounds; Ketene, Ketenyl, and Ketenylidene Complexes", by G.L. Geoffroy and S.L. Bassner (83 pages, 232 refs.); "Graphite-Metal Compounds", by R. Csuk, B.I. Glänzer, and A. Fürstner (52 pages, 280 refs.); "Nucleophilic Activation of Carbon Monoxide; Applications to Homogeneous Catalysis by Metal Carbonyls of the Water Gas Shift and Related Reactions", by P.C. Ford and A. Rokicki (98 pages, 396 refs.); "Organopalladium and Platinum Compounds with Pentahalophenyl Ligands", by R. Usón and J. Forniés (78 pages, 142 refs.); "H-H, C-H, and Related  $\sigma$ -Bonded Groups as Ligands", by R.H. Crabtree and D.G. Hamilton (39 pages, 142 refs.); "Organometallic Compounds Containing Oxygen Atoms", by F. Bottomley and L. Sutin (57 pages, 282 refs.); "Recent Developments in NMR Spectroscopy of Organometallic Compounds", by B.E. Mann (60 pages, 73 refs.) The volume concludes with a subject index (9 pages) and the usual cumulative list of contributors (3 pages).

The chapter by Usón and Forniés probably deals with the narrowest field and is devoted very largely to contributions from the senior author's laboratory. The remaining chapters provide surveys of well defined areas of organometallic chemistry.

The chapter by Csuk et al. is the only one which does not deal with chemistry at the molecular level. However, the graphite intercalation compounds are interesting reagents for the organometallic chemist. The emphasis is on the structural properties of the materials and their use in organic and organometallic synthesis. Accordingly, the major sections are entitled "Graphite-Metal Compounds" (12 pages) and "Synthetic Applications" (31 pages). As for the second part, among interesting matters discussed are: the use of alkali metal graphite intercalation compounds as reagents, or as catalysts; and graphite surface compounds, including graphite intercalation compounds (with Mg, Ti, Ni, Fe, Zn, or Sn), as reagents.

Chapter 1 is slightly misleading in its title in that the organometallic compounds discussed do not include any which are derived from a main group element. There certainly are examples of insertion of a ketene into bonds such as B-N in the literature. Nevertheless, this is an impressive survey dealing with: (1) reactions of ketenes with organotransition metal complexes (13 pages); (2) metal complexes possessing ketene ligands, including their reaction chemistry (39 pages); (3) ketenylmetal complexes (11 pages); and (4) ketenylidene complexes (9 pages). This is a most thorough account and has much tabulated data on individual species.

The chapter by Ford and Rokicki is concerned with describing the role of  $M-C(:O)Nu$  (**1**) ( $Nu =$  nucleophile) in the stoichiometric and catalytic chemistry of metal carbonyl complexes. The first section (20 pages) is devoted to the preparation and properties of complexes of type **1** (e.g.,  $Nu = OH, OR, NRR', H, R,$  or  $O$ ). The second section deals with equilibrium and kinetics of adduct

formation (10 pages). The third section describes reactivities of adducts (17 pages). The final portion deals with homogeneous catalysis of the water gas shift and related reactions. This account is a very impressive document with much tabulated data.

The review by Crabtree and Hamilton is very topical. The first section is devoted to dihydrogen-metal complexes (16 pages). The paper by Kubas et al. in 1984 has already led to much interest in this area. The second part deals with complexes containing C-H bonds as ligands (15 pages) and is largely concerned with metal complexes having agostic hydrogens. Although the first examples were observed in the mid-1960's, the existence of a clear field only became evident with the contribution of Brookhart and Green (1983). While this part of the review is undoubtedly valuable, it might have been useful to wait another two or three years before once again surveying this field. Nevertheless, Professor Crabtree has made important relevant contributions, and there is no doubt about the authority of the coverage.

The penultimate chapter is once again slightly misleading in its title. It in fact deals with organotransition metal complexes which formally may be regarded as having one or more  $O^{2-}$  ligands. The first section (4 pages) is concerned with synthesis and includes inter alia the X-ray structures of  $[CpTi]_2(\mu-\eta^1: \eta^5-C_5Me_4CH_2)(\mu-O)_2$  and  $[Cp_5(O)V_6(\mu_3-O)_8]$ . The second is devoted to transition metal alkyls or aryls containing oxo linkages (4 pages). The third is entitled "Oxo Alkylidene, Alkylidyne, Olefin, Acetylene, and Carbonyl Compounds" (5 pages), and including inter alia the X-ray structure of  $[Fe(CO)_3][CpW(O)_2][CpW(CO)]\{\mu_3-\eta^2-C_2(C_6H_4Me)_2\}$ . The fourth is concerned with cyclopentadienylmetal complexes (13 pages), and the fifth describes organometallic clusters (13 pages). The final section is concerned with organometallic polyoxometallates (5 pages) exemplified inter alia by  $[CpTi(Mo_5O_{18})]^{3-}$ . There is much valuable information provided in the form of tables, schemes, and structures.

The final chapter, which obviously will be of interest to the widest group of readers of this Journal, is written from the standpoint of the synthetic organometallic chemist who is interested in using NMR in an up-to-date fashion. It is, inevitably, the only contribution in this volume which is selective in its choice of examples rather than being comprehensive. One-dimensional experiments are discussed first and then 2D counterparts; the experimental aspects and some results from multinuclear NMR (all too brief) are then dealt with and, finally, some examples from solid-state NMR. Particularly conspicuous is the absence of examples taken from main group element chemistry. (There appears to be a clerical error on p. 423;  $^{13}C$  chemical shifts surely rarely show significant temperature dependence; a "not" is missing).

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*Phase Equilibria in Binary Halides*, by V.I. Posypaiko and E.A. Alekseeva, IFI/Plenum, New York, Washington, London, 1987, xxv + 470 pages, \$115, ISBN 0-306-65211-0.

As its title unambiguously suggests, this book contains a collection of phase diagrams and data concerning phase equilibria for binary halide mixtures (i.e.