

Methods for the synthesis of the structurally non-characterized species, S_{9-11} , are included as are several examples of incorporation of O, Se, and Te into sulfur rings.

Chapters covering the reactivity of molecular species containing halogen are titled: "Preparation and reactions of perfluorohalogenoorganosulfenyl halides" by A. Hass and U. Niemann, and "Chlorine oxyfluorides" by K.O. Christe and C.J. Schack. These authors have published extensively in their respective fields and as one would expect, both chapters include a tremendous amount of chemistry. The chapter by Christe and Schack also includes a wealth of structural as well as IR and Raman data.

Dr. Joan Mason's contribution, "Correlations in nuclear magnetic shielding, Part I" summarizes, in table form, nuclei which have been examined by NMR techniques as well as pointing out nuclei of potential NMR interest in terms of likely success. Pairwise additivity shielding effects of substituents for various nuclei are discussed and nicely summarized in graphic form.

The chapter titled, "Some applications of mass spectroscopy in inorganic and organometallic chemistry" by Jack M. Miller and Gary L. Wilson includes a tremendous amount of invaluable information in terms of "how to do it" experience-gained experimental "tricks" associated with mass spectroscopy. Numerous examples are analyzed in detail and presented in a very readable form. I would expect an increase in the use of mass spectroscopy by readers of this excellent contribution to this latest volume of "Advances in inorganic chemistry and radio chemistry."

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Advances in Organometallic Chemistry, Vol. 14; edited by F.G.A. Stone and R. West, Academic Press, New York/San Francisco/London, 1976, xi + 414 pages, \$38.50, £ 22.35.

Since the appearance of the first volume of this well-known series in 1964, the Editors have maintained a standard of high quality and a selection of topics representing the diverse specializations within organometallic chemistry. This Volume commemorates the twelve year publication of this series by emphasizing this diversity as well as the international character of organometallic chemistry. Nineteen authors representing six countries contribute ten review articles in a nearly equal split between transition metal and Main Group metal chemistry. Only three of these authors have contributed articles in previous volumes of this series, and four authors were contributors to the Centenary Volume of the *Journal of Organometallic Chemistry*.

The Volume begins, very appropriately, with the translated version of E.O. Fischer's Nobel lecture, "On the Way to Carbene and Carbyne Complexes." This article is both a personal and professional account of the synthesis of the first carbene and carbyne complexes. The extensive reaction chemistry and structural characterization of these unique complexes is summarized with emphasis on the work from the Fischer laboratory.

Ittel and Ibers discuss the π -coordination of selected unsaturated molecules to transition metals. Although data from various physical techniques are presented, the most important discussion reviews the structural parameters which can be determined by X-ray crystallography. The values of these parameters are related to the mode of ligand coordination via theoretical bonding models. Only nonring, unsaturated molecules which interact with the metal atom through one double bond are examined. Although olefins are emphasized, acetylene, diazene, ketone, and imine complexes are mentioned briefly.

Petrosyan, Yashina, and Reutov present an up-dated review of the methyltin halides and their molecular complexes. This translated contribution is an excellent example of an area of chemistry whereby a variety of physical methods must be used for the elucidation of molecular structure of both pure compounds and solution species. The discussion of the solid-state structural data could be improved slightly by including detailed figures showing the molecular packing arrangement.

Seyferth's review of the chemistry of carbon-functional alkylidynetricobalt nonacarbonyl complexes is a personal account of a very productive area of synthetic organometallic chemistry. The systematic and very thorough nature of this research is quite impressive. A wide variety of organometallic reagents is used in the preparation of these complexes, and the inclusion of unexpected reactions and the pursuit of much desired complexes makes this account very enjoyable reading.

An in-depth review of ten years of n -bonded metallocarborane compounds is contributed by Callahan and Hawthorne. Only complexes of 2-carbon carboranes having between nine and fourteen total polyhedral vertices are discussed. The authors successfully simplify the complexity of metallocarborane chemistry. The synthetic procedures are classified into five methods, and the frequent use of detailed figures makes this article much easier reading for those who are unfamiliar with the IUPAC nomenclature.

Okawara and Matsumura summarize recent advances in organoantimony chemistry. The chemistry of the triorganostibine sulfides, the resolution of the first quaternary stibonium ion and the complexes of antimony with transition metal carbonyls are particularly interesting topics.

Schmidbaur reviews the pentaalkyl- and trialkyl-alkylidene compounds of the Group V elements. Fortunately, the phosphorus ylides are discussed briefly with major emphasis on the search for stable pentaalkylphosphoranes and the compounds of the heavier congeners of this group. The inclusion of the alkyl and carbene (ylide) complexes of the Group V transition metals demonstrates the wide scope of organometallic chemistry.

The implication of acetylene and allene complexes in homogeneous catalysis is discussed by Otsuka and Nakamura. It is impossible to read their discussion of the structure and bonding of these complexes without referring to the contribution by Ittel and Ibers. The unambiguous structural data yields to the uncertainty of the reaction mechanisms involved in catalytic reactions. The authors adopt the well-known approach of reducing a complex reaction to a sequence of simpler reactions for rationalizing the effects of added ligands and the incorporation of isotopically labeled reagents.

Chini, Longoni, and Albano review metal carbonyl cluster compounds

which contain five or more metal atoms. This is, perhaps, the most complete review of the Volume. Solid state and solution structural data, synthetic methods, chemical reactivity and bonding are discussed equally well. A superficial similarity in structure between these clusters and the metallocarbonanes may not be coincidental.

The occurrence of free radicals in organometallic chemistry is reviewed selectively by Lappert and Lednor. This is an appropriate concluding article since both Main Group and transition metal compounds are afforded nearly equal attention. A very useful table listing reviews relevant to this area is included. The strength of this article is that a few systems are discussed in some detail; therefore, the complexities of synthesizing and observing short-lived species can be fully appreciated. Again, the most pertinent information is the most difficult to obtain.

The notice of some obvious typographical errors and the inconsistent format of referencing does not detract from the high quality this Volume contributes to the series. Hopefully the next twelve years of organometallic chemistry will produce an equally impressive volume.

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