cursors such as $[(PPh_3)_3RhCl]$ and $RhCl_3$ failed to affect the reaction at 25 °C. Due to a paucity of detailed information, further speculation regarding this mechanism is unwarranted at this time.

Acknowledgment. We gratefully acknowledge the Basic Science Division of the Department of Energy for the support of this research under Grant No. DE-AT03-80 ER10073.

Supplementary Material Available: Tables of atomic positions, thermal parameters, bond lengths and angles, and structure factor data for **2** and **3** (48 pages). Ordering information is given on any current masthead page.

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(8) ^1H NMR (C_6D_6, 25 °C, ppm); 4.64 (m, 2 H, cyclopentadienide C–H), 4.54 (m, 2 H, cyclopentadienide C–H), 1.97 (q, $J = 7.5$ Hz, 2 H, secondary C–H of ethyl group), 1.90 (s, 6 H, carboranyl methyl C–H), 0.80 (t, $J = 7.5$ Hz, 3 H, tertiary C–H of ethyl group). $^{11}B\{^1H\}$ NMR (C_6D_6, 25 °C, ppm): 6.15 (1), 4.12 (1), –0.33 (2), –8.28 (2), –13.36 (2), –14.87 (1). Mass spectrum: m/z $(RhC_{11}H_{24}(^{10}B)(^{11}B)_8)^+$ calcd 357.1800, obsd 357.1827.

Additions and Corrections

D. M. Roddick, M. D. Fryzuk, P. F. Seidler, G. L. Hillhouse, and J. E. Bercaw*: Halide, Hydride, Alkyl, and Dinitrogen Complexes of Bis(pentamethylcyclopentadienyl)hafnium. **1985**, *4*, 97.

In eq 12 on page 99, $Cp^*{}_2MH$ has a subscript missing. The formula should read $Cp^*{}_2MH_2$.

On page 103, the experimental details for the preparation of $Cp^*{}_2HfCl_2$ (**2**) were incompletely reported. A revised preparation is given below. LiCp* was prepared by the method of Threlkel and Bercaw (*J. Organomet. Chem.* **1977**, *136*, 1). $HfCl_4$ (31.8 g, 0.099 mol) and LiCp* (31.0 g, 0.218 mol) were placed in a flask with 200 mL of xylene and refluxed under argon for 3 days. The xylene was then removed under vacuum, and the residue was suspended in 200 mL of CH_2Cl_2 and 200 mL of 4 M HCl. The CH_2Cl_2 layer was separated and the aqueous layer washed four times with 20-mL portions of CH_2Cl_2. The CH_2Cl_2 solutions were combined and dried over $MgSO_4$. Crystallization from CH_2Cl_2/petroleum ether afforded **2** in 76% yield (39.1 g).

Book Reviews

Chemical Mössbauer Spectroscopy. Edited by R. H. Herber. Plenum Press, New York, London. 1984. xiii + 378 pages. $59.50.

This book is the proceeding of a symposium entitled "Twenty-Five Years of Chemical Mössbauer Spectroscopy", held April 8–13, 1984, in St. Louis, MO, as part of the 187th national meeting of the American Chemical Society. The editor has done a remarkable job in getting this volume printed and published in less than 1 year, for a reasonable price. This was not achieved without some sacrifices however. The quality of the figures and the typescript varied considerably from chapter to chapter as might have been expected from the use of camera-ready manuscripts. Some chapters were particularly difficult to read because of the overlapping of subscripts and superscripts with the lines immediately below and above. Camera-ready copy also places the sources of errors in each chapter squarely on the individual contributors. Fortunately, except for two chapters, typographical errors are few.

Unfortunately the first chapter is the one which contains the most errors, which I hope are typographical, and this creates a poor impression. In this chapter the discussion of the origin of the isomer shift and its relation to the s electron density is confusing and that concerning the quadrupole interaction incorrect. The expression $\Delta E_Q = {}^1/_2\, e^2qQ(1 + \eta^2/3)^{1/2}$ is correctly given as the quadrupole splitting, but two lines later it is stated that the spectrum will be a Lorentzian-shaped doublet with $2\Delta E_Q$ splitting. A few lines below it is stated that when $\eta = 0$, $\Delta E_Q = e^2qQ/2$ and the quadrupole coupling constant, as defined by NQR (i.e., e^2qQ), is half the peak separation. Surely e^2qQ is twice the doublet separation. Later in this chapter ferrocene is reduced by removing an electron. These errors should have been eliminated by careful proofreading. I also found the sections listing data for many compounds very difficult to follow; these data should have been presented in tables.

The next two chapters were a pleasure to read. The first of these presents a clear summary of the phenomenon of high spin–low spin transitions and of light-induced crossover. The next, on the application of magnetic ordering phenomena, would be useful to those interested in carrying out research in this area of Mössbauer spectroscopy and particularly valuable as an aid to beginning researchers in the field. Both of these chapters, as does the chapter on organotin chemistry, emphasise the necessity of carrying out complimentary studies to support the Mössbauer data.

Intercalation compounds are of current interest to chemists and physicists, and an excellent review is presented in this volume that will be invaluable to researchers in the field. A minor criticism is that a discussion of lattice dynamics occurs in three separate chapters. Some consolidation of this subject matter could perhaps have been made, though I realize that this would be difficult in a book of this nature. Reviews of biological molecules, soils, and sediments, liquid crystals, and hot atom chemistry were well prepared and good reviews of these particular areas. The last of these appeared rather qualitative, none of the spectra shown having been fitted in any obvious way.

The chapters on the application of the technique to the chemistry of Sn, Sb, and I were of particular interest to me. Mössbauer spectroscopy is particularly valuable to the tin chemist, and this review points out the advantages that can acrue as well as the pitfalls that can occur to the unwary. In this regard two errors should be corrected which are not the author's fault. The data in ref 98 are not those from the orthorhombic form of SnF_2, and the data for molten SnF_2 (ref 150, the page number should be 1831 not 2296) are erroneous. This latter is a particular embarrassment to this reviewer, and a correction is in press. Discussion of recent iodine data is presented in terms of valence orbitals while the antimony reviewer prefers a more theoretical approach. The constrast is interesting. The latter review omitted, deliberately, much ^{121}Sb data on none organoantimony compounds that would have been invaluable for researchers in this field of chemistry.

The last two chapters in the book were not very current accounts of the activity in these areas and could well have been omitted.

In spite of the problems with the camera-ready formate I enjoyed reading the book and think it would be a useful addition to the library of Mössbauer spectroscopists and to those contemplating entering the field.

T. Birchall, *McMaster University*

Progress in Inorganic Chemistry. Volume 32. Edited by S. J. Lippard. Wiley, New York. 1984. v + 714 pages. $85.00

Six well-written and carefully produced reviews on diverse topics are presented in Volume 32 of "Progress in Inorganic Chemistry". The reviews are up to date with many 1982 and, in some cases, 1983 references.

The review of stereodynamics of metal complexes of sulfur-, selenium-, and tellurium-containing ligands by E. W. Abel, S. K. Bhargava, and K. G. Orrell (118 pages) starts out with a brief general description on the use of NMR to probe dynamic processes. The first major section describes pyramidal inversion at the chalcogen atom and is arranged by the metal to which the ligand is coordinated. Fluxional rearrangements that involve reorganization of the metal–chalcogen bonding are considered next, and the last section covers conformational changes of chalcogen rings coordinated to metals.

R. R. Holmes presents a review on five-coordinate structures (115 pages). The heart of this review is an extensive compilation of known structures (arranged by metal) including a drawing, bond distances, bond angles, and two parameters that relate to the position of the structure along the Berry exchange coordinate that converts a trigonal bipyramid to a square pyramid. Structure trends are related to a number of important factors such as the number of d electrons and ligand types. Stereodynamic processes and the relevance of five-coordination to biological systems are also discussed.

The review of homo- and heteronuclear cluster compounds of gold by K. P. Hall and D. M. P. Mingos (88 pages) outlines the synthesis, characterization, and bonding theories of both homonuclear and heteronuclear gold clusters. Particular emphasis is placed on the correlation of bonding theories with known structural types.

The review of electrides, negatively charged metal ions, and related phenomena by J. L. Dye (115 pages) emphasizes the preparation and characterization of alkalides and electrides by a variety of physical techniques. Considerable detail is given on the experimental methods used to handle these unstable species. The area of solvated electrons is also reviewed as an introduction to alkalides and electrides.

The review of long-range electron transfer in peptides and proteins by S. S. Isied (75 pages) covers electron-transfer reactions of biological systems with an emphasis on electron movements of over 10 Å. After a general overview, sections are presented on long-range electron transfer in model systems, protein electron-transfer studies, and electron transfer across polypeptides.

J. D. Kennedy presents the first of a two-part series covering the polyhedral metalloboranes, part I—metalloborane clusters with seven vertices and fewer (161 pages). This comprehensive review limits its coverage to compounds containing only metal and boron atoms in the actual cluster positions. The topics are arranged by number of vertices and within each class by structural types (closo, arachno, etc.). Most structures are described in terms of a simple valence-bond approach which makes the review easy to follow even for workers outside this basic area.

Daniel L. Reger, *University of South Carolina*

Advances in Organometallic Chemistry. Volume 23. Edited by F. G. A. Stone and R. West. Academic Press, New York. 1984. vii + 324 pages. $65.00.

When your reviewer was a good deal younger, candy bars, for instance, the well-known Hershey bar, underwent distressing transformations. At first, the price (5¢) remained the same, but, with time, the size of the candy bar decreased. Then the size decreased some more, but, at the same time, the price increased. One paid more and more for less and less. Looking at my shelf of previous volumes of "Advances in Organometallic Chemistry", I find that a somewhat similar process has been taking place. In 1965 (Vol. 3), one obtained 478 pages for $17.50; the 1975 Volume 13, 562 pages in length, cost $44.50. The present volume of 324 pages goes for $65.00. An extrapolation to 1995 does not bear thinking about.

The present volume contains five reviews. In the first chapter, N. G. Connelly and W. E. Geiger, in a broad survey of 93 pages, discuss electron-transfer reactions of mononuclear organotransition-metal complexes. This review is organized first by ligand type and then by element groups, and it covers the subject well. The focus is on electrochemistry. The subject of this review is an important once since an ever increasing number of processes in organic, inorganic, and especially, organometallic chemistry which were thought to be strictly polar in nature now are being found to proceed, at least in some cases, by electron-transfer mechanisms.

The title of the second chapter, "Redistribution Reactions of Transition Metal Complexes", by P. E. Garrous, is somewhat misleading. The usual definition of the "redistribution reaction" involves a process in which there is a substituent exchange between molecules *with the same central atom*, but in the present instance the definition is the more general one, involving ligand exchange between compounds with the same *or different* central metal atoms ($MA + M'B \rightleftharpoons MB + M'A$; $M = M'$ *and* $M \neq M'$). Thermodynamics of such processes and the experimental methods used in their study are discussed, and then such transfer processes are considered by ligand type (e.g., π-allyl, cyclopentadienyl, halide, CO, R_3P, alkyl, hydride). The point is made that such reactions can be of importance in catalytic processes.

Chapter three brings a very narrowly focused review by N. Wiberg on *N*-silyl, -germyl, and -stannyl derivatives of $HN{=}NH$, very reactive compounds whose preparation and chemistry have been developed in large part by the author and his co-workers. Their efforts merit our admiration: compounds of type $R_3SiN{=}NSiR_3$ and $R_3GeN{=}NGeR_3$ decompose slowly above −35 °C, are extremely air-sensitive, are readily hydrolyzed, and are decomposed by UV irradiation. Yet there is enough known about them to provide material for a chapter of 61 pages.

The fourth chapter, by T. A. Blinka, B. I. Helmer, and R. West, is out of place in this volume. Their short (26 pages) discussion of polarization transfer NMR spectroscopy for silicon-29 (INEPT and DEPT techniques) would have been more appropriate for a book on advances in NMR spectroscopy.

The last chapter, an 87-page review on "C- and O-Bonded Metal

Carbonyls: Preparation, Structures and Reactions", by C. P. Horwitz and D. F. Shriver, discusses all the ways CO can be bound to metals and also the influence of -CO- bonding on reactivity. This is an interesting and useful chapter, one which will find many interested readers since research on metal carbonyl chemistry continues at a brisk pace.

The book concludes with a subject index and indexes (authors and titles) of all the reviews published in the 23 volumes of this series. The present volume, on the whole, is not as good as many of the previous ones of this series. Only three of its five chapters will be of general interest to organometallic chemists. Also, the book is not as up-to-date as it might be. The last chapter brings 1983 and 1984 references in a "note added in proof", while the first chapter provides an addendum covering the 1983 literature. Garrou's review cites no references past 1982, and Wiberg's chapter has few references later than 1980 (this, however, merely may reflect lack of current activity in that field).

Dietmar Seyferth, *Massachusetts Institute of Technology*

Organotin Compounds in Modern Technology. Journal of Organometallic Chemistry Library. Vol. 16. C. J. Evans and S. Karpel, Eds. (International Tin Research Institute). Elsevier, Amsterdam/New York. 1985. x + 279 pages. $72.25.

This book presents a thorough review of the numerous industrial applications of organotin compounds which have been effected during the last few decades. There are elaborate chapters on PVC stabilization, catalysis in polyurethane and silicone technology and industrial esterification processes, wood preservation, antifouling systems, and agricultural chemicals. Basic chemistry is kept to a minimum. The various industrial processes and applications in which organotin compounds play a beneficial role are described circumstantially. A separate chapter is dedicated to medical uses of organotin compounds. In the fight against Bilharzia, specific organotins are of potential interest but have not yet found WHO approval. Recently antitumor activity has been discovered for a broad range of organotin compounds. Actual medical applications of these compounds do not yet occur, and the authors' remark that an increased use of "tin" in medicine is likely to take place in the not too distant future would seem to be rather optimistic. A chapter on miscellaneous biocidal uses presents information on the application of organotin biocides in the protection of various materials such as stonework, paints, textiles, paper, and plastics, disinfectants in hospitals and of textile materials, anthelmintics in poultry, and insecticides for sheep and cattle. A separate chapter on monoorganotins deals with the application of such compounds in PVC stabilization, strengthening of glass by surface coating with tin oxide films, trans esterification, and waterproofing treatments of textiles and bricks. A compendious survey of environmental aspects of organotin compounds makes up the last chapter. Numerous illustrations enliven the text.

This book is clear and well written and provides excellent value for the money to anyone interested in current industrial applications of organotin compounds.

Harry A. Meinema, *Institute of Applied Chemistry TNO*

Reactive Intermediates. Vol. 3. Edited by M. Jones, Jr., and R. A. Moss. Wiley, New York. 1985. ix + 435 pp. $79.50.

The third volume of this well-received series has appeared, and its intention is "again to provide authoritative and critical analyses of the recent literature for each major type of reactive organic intermediate".

The book fulfills this promise in nine chapters, the same as in the second volume (arynes, carbanions, carbenes, metal–carbene complexes, diradicals, carbocations, free radicals, nitrenes, and silylenes). The articles range in length from 19 to as many as 96 pages, more or less corresponding to the recent developments in the various fields. Experienced authors, all active in the corresponding field, "have been urged to select critically" the literature for the period 1980–1982 in continuation of the Volume 2 reviews, with some references to 1983.

As in the earlier volumes, the chapters in general can be regarded as excellent sources of recent results for workers "who are actively involved or contemplating involvement" in the particular field. With respect to the purpose of the present journal, most of the articles are relevant to organometallic chemistry. The chapter dealing with silylenes (P. P. Gaspar) is by far the longest (96 pages), and it gives a good account of the lively developments in the field of silylene chemistry. In this connection, it may be suggested that the heavier members of the carbene family, the germylenes and stannylenes, be included in future volumes. As is unavoidable in a multiauthor work, the points of view of the different authors are not always exactly the same. In the free radical chapter, the second longest (78 pages, L. Kaplan), e.g., much importance is given to theoretical or more exotic aspects and spectroscopic methods, much less, however, to resonance-stabilized radicals. Synthetic applications are dealt with rather briefly. A discussion of G. Viehe's concept of capto-dative stabilization of free radicals would have been welcome. A little bit confusing is the presentation of additional remarks and information in the form of footnotes spread through the references in this article.—Some of the reviews contain the complete titles of the cited publications in the list of references, which provides additional information to the reader.—The book is quite readable. A good index is provided.

Wilhelm P. Neumann, *University of Dortmund*

Sodium Dihydrido-bis-(2-methoxyethoxo)aluminate (SDMA). A Versatile Organometallic Hydride. Journal of Organometallic Chemistry Library. O. Štrouf, B. Čásenský, and V. Kubánek, Eds. Elsevier, Amsterdam. 1985. 236 pages. $72.25, Dfl. 195.00.

The title compound may be versatile, it certainly is a hydride, but an *organometallic* compound it is not. The compound in question is $NaAlH_2(OCH_2CH_2OCH_3)_2$: it contains metal–hydrogen and metal–oxygen bonds, but no metal–carbon bonds. Nonetheless, it is a compound which will be of some interest to the organometallic chemist (but more so to the synthetic organic chemist). It is a useful, reactive reducing agent, very soluble in various organic solvents including aromatic hydrocarbons, and quite safe to handle and use. This complex hydride was discovered and developed by Czechoslovakian chemists, and it is now commercially available in the "Western" world.

This book brings all that one would need to know about $NaAlH_2(OCH_2CH_2OCH_3)_2$: its preparation and properties, its applications in organic chemistry, its reactions with organometallic compounds, and its applications in polymer chemistry, along with exhaustive literature coverage. As such, this is a useful book, one which one would like to see on the library shelves. However, few will want to spend $72 of their own money for such a narrowly focused book.

The reader might be interested in a comparison of $NaAlH_2(OCH_2CH_2OCH_3)_2$ with lithium aluminum hydride, which to date has been the most widely used complex aluminum hydride. Such a comparison can be made by referring to the chapter on $LiAlH_4$ in Vol. 1 of Pizey's "Synthetic Reagents".

Dietmar Seyferth, *Massachusetts Institute of Technology*