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Book review

Organoborane Chemistry; by Thomas Onak, Academic Press, New York and London, 1975, x + 360 pages, $38, £18.25.

New research students in organoborane chemistry often ask for a book that will give them a good general background in the field. The answer that no single source existed has now been fortunately repealed by Onak's book, with its succinct coverage of more than 2000 references.

The topics covered include the chemistry and physical properties of three-coordinate and four-coordinate organoboron compounds, alkyldiboranes, and alkylated polyhedral boranes and borane anions. Carboranes are not included, since these have been reviewed by Grimes in an earlier monograph in this series. Emphasis is placed on reactions which make or break carbon—boron bonds. A particularly valuable feature is the extensive tables of known organoborane structures, which can rapidly provide the research worker with a good general idea of what types of organoboranes are known and what remain as research problems. Another useful feature is the integration of hydroboration chemistry into the broader context of general organoborane chemistry. The only serious omission to be pointed out to novice boron chemists is the failure to discuss the general rapidity of exchange of electronegative ligands on boron, for example, the rapid exchange of $(RO)_2BR'$ with H_2O to form $(HO)_2BR'$ and ROH.

This book is valuable to research workers because of its comprehensive coverage of the literature through the decade of the 1960's. The reviewer checked for completeness the easy way by examining the coverage of his own work. One missing structural type was found, $(CH_2{=}CH)_2BOR$, though the heterocycle formed by radical addition of H_2S to the vinyl groups is cited. One important missing reaction was noted, carbon—carbon bond formation by rearrangement of $Cl_3CCH_2CHBr(R)(OBu)_2^-$ to $Cl_3CCH_2CHRB(OBu)_2 + Br^-$, though mechanistically analogous alkoxy group migrations from the same article are cited, and H.C. Brown's later and synthetically more significant discovery of carbon—carbon bond formation by rearrangement of α-haloalkylboranes is covered. These omissions are minor compared to the large number of structures and reactions discussed. After about 1969, coverage becomes more spotty. Several of the reviewer's papers which introduce the use of boron-substituted carbanions to synthesize carbon—carbon and carbon—metal bonds are omitted entirely, though a 1973 communication referencing these and describing the isolation of $Li^+ C[BO_2(CH_2)_3]_3$ is included.

The principal limitation of this book is its quotation of all author's claims without skepticism. For example, "*o*-$(HO)_2BOC_6H_4B(OH)_2$" (p. 59) and "*o*-$Cl_2BOC_6H_4BCl_2$" (p. 65) are tabulated without comment, even though the usually rapid exchanges of B—O and B—Cl linkages make it seem unlikely that such structures would be stable and isolable, and the literature cited does not provide anywhere near enough evidence to make such unusual results credible. It is noted that there has been disagreement as to whether B_2Cl_4 adds *cis* or *trans* to cyclopentene (p. 39), but it is not mentioned that the claim for *cis* addition is more recent and better documented. A number of other doubtful quotations could be cited, but these fortunately represent a very small proportion of the organoborane literature. It is difficult if not impossible for a single author to write a review of a major topic that is simultaneously comprehensive, critical, and timely. Onak's book is comprehensive and timely, and therefore welcome.

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Errata

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Page 257, line 13 of the Introduction should read:

the two parameters give complementary informations on the nature of σ- and π-

Page 259, line 6 should read:

From IR and PMR data a *cis*-geometry was assigned to compounds I-IV