

Book Review

Boron-Nitrogen Chemistry. Advances in Chemistry Series, No. 42. Edited by Robert F. Gould. American Chemical Society, 1155 Sixteenth St., N.W., Washington, D. C. 1964. x + 330 pp. 15.5 × 23.5 cm. Price, \$7.50.

"Boron-Nitrogen Chemistry" is a collection of 32 papers which were presented at an international symposium at Durham, N. C., in April, 1963. In general, the papers are of high or good quality, reflecting the care and effort with which Dr. Kurt Niedenzu organized the symposium. Many of the articles are well-documented with extensive bibliographies but also present information which has not yet been published. This collection of papers is a worthwhile investment for anyone with a serious interest in boron-nitrogen chemistry.

In view of the large number of articles involved, this reviewer has placed them in categories and considers briefly only their principal contributions.

Structure.—W. N. Lipscomb and R. Lewin describe the molecular structure of $C_2H_5NH_2B_3H_{11}NHC_2H_5$ and discuss in detail the radius of boron and boron-boron distances in a large number of compounds.

Theoretical.—Four papers which describe the results of LCAO-MO calculations are presented. R. Hoffman is concerned with conformations, barriers to internal rotation, isomerization energies, and charge distributions in various boron-nitrogen systems. An especially interesting result concerns the charge distribution in the B-N bond, in which nitrogen is always found to bear a higher negative charge than boron. An earnest plea is stated for abandoning the misleading formulation B^--N^+ .

The remaining theoretical papers form a series by Joyce Kaufman and collaborators. They are concerned with bond orders and charge distributions in aminoboranes, borazines, and heteroaromatic systems where a C-C pair is replaced by B-N. For the borazines a charge distribution of B^--N^+ is found; for the heteroaromatic compounds B^+-N^- is found.

Vibrational Spectroscopy.—Vibrational assignments and force constants of several amine boranes are discussed by R. C. Taylor. H. Goubeau considers force constants in amine boranes, aminoboranes, and trimeric borazines. H. J. Becher and H. T. Baechle discuss the B-N stretching frequency in aminoboranes and the effect of phenyl substitution on the B-N bond.

N.m.r. Spectroscopy.—Brey and co-workers and Totani and collaborators treat proton magnetic resonance and bonding in aminoboranes. Evidence is presented for restricted rotation around the B-N bond which is attributed to double bond character.

Kinetics and Mechanism.—S. H. Bauer and co-workers present the results of gas phase reactions of B_2H_6 and BF_3 with various amines.

Ryschkewitsch considers the mechanism of solvolysis of a number of amine boranes, correlating results with structural features. Brotherton and McClosky discuss hydrolysis rates for series of tri(amino)boranes and tetra(amino)diborons.

H. K. Zimmerman discusses relations between coordination stability and structure in boroxazolidines. The effect of structure on rates of reactions with strong acids and reaction mechanisms is discussed. Dipole moments of boroxazolidines and six- and seven-membered ring analogs are given. Evidence is given for a B-N dative bond in these compounds.

Synthesis and Chemical Studies.—M. J. S. Dewar reviews the chemistry of heteroaromatic compounds containing boron atoms as components of six-membered rings. Evidence for aromatic character is discussed.

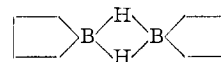
R. Letsinger discusses syntheses, ultraviolet spectra, and catalytic properties of neighboring amine groups.

Reactions of triphenylphosphinimines with boron compounds, organometals, and Lewis acids to form compounds containing B-N and Sn-N bonds are described by H. Zimmer and G. Singh.

H. Watanabe and co-workers discuss the preparation and possible structure of tris(dialkylboryl-2-pyridylamino)boranes, $B_3R_6N_3py_3$.

J. K. Ruff reports on the reaction of $(CH_3)_3N$ with $H_2AlBH_4N(CH_3)_3$.

R. Köster and K. Iwasaki describe the chemistry of the bisborolanes



with particular emphasis on reactions with amines.

The preparation and chemistry of hydrazinoboranes is discussed by H. Nöth and W. Regnet.

The reaction of tri-*n*-butylborane with nitric oxide to produce the products R_3NOBR_2 , $R_2BN(OR)NO$, and $R_2BNROBR_2$ is described by M. Inatome and L. P. Kuhn.

E. J. Mezey, P. R. Girardot, and W. E. Bissinger discuss the amination of alkoxyboranes by diamines to produce polymers.

T. L. Heying and H. D. Smith, Jr., describe aminoboration reactions with isocyanates and isothiocyanates.

M. F. Lappert and M. K. Majumdar discuss the synthesis, structure, stereochemistry, and mechanism of formation of a B-N substituted cyclobutadiene analog.

R. H. Cragg and M. F. Lappert describe the preparation of a variety of cyclic boroureas and borocarbamates.

D. Seyferth and co-workers present a review of their recent work on the synthesis of B-organofunctional borazine derivatives.

The preparation and properties of some B-fluorinated borazines is discussed by H. Beyer and co-workers.

A. W. Laubengayer and O. T. Beachley, Jr., describe conditions for the synthesis of the bicyclic B-N compound borazanaphthalene, $B_5N_5H_5$.

Turner and Warne discuss the preparation, properties, and structure of tetrameric borazynes $(RNBX)_4$. A companion paper by J. H. S. Green and co-workers presents vibrational spectra and discusses the possible conformation of the tetrameric borazyne ring.

R. W. Parry and co-workers describe reactions of amines with H_3BCO and B_4H_3CO . The properties of the products are discussed.

DEPARTMENT OF CHEMISTRY
THE OHIO STATE UNIVERSITY
COLUMBUS 10, OHIO

S. G. SHORE

BOOKS RECEIVED

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M. H. FORD-SMITH. "The Chemistry of Complex Cyanides." Department of Scientific and Industrial Research. State House, High Holborn, London W.C. 1, England. Published by Her Majesty's Stationery Office, London, England. 1964. vi + 93 pp. 27s. 6d.