considerations with the chemistry reported. It was proposed from bonding principles[6] and molecular orbital energies[7] that the *meta* isomer should be more stable than the *ortho* isomer. Thus the preparation of neocarborane,[4] which was obtained from carborane at approximately 470°, is in accord with this assumption. As opposed to the participation of carborane in five-membered exocyclic rings,[2,3] similar reactions of neocarborane[4] led only to noncyclic derivatives. Also, comparison of neocarborane derivatives with the analogous carborane derivatives has shown that the former are almost invariably lower melting; this would indicate that the former are of a more unsymmetrical conformation than the latter. From additional work in progress in this laboratory, we have not encountered any evidence which would contradict this assignment.

Acknowledgment.—The authors are indebted to Prof. W. N. Lipscomb and Dr. T. L. Heying for helpful discussions and wish to acknowledge the support of this work by the Office of Naval Research.

(6) W. N. Lipscomb, *Proc. Natl. Acad. Sci. U. S.*, **47**, 1791 (1961).
(7) R. Hoffmann and W. N. Lipscomb, *J. Chem. Phys.*, **36**, 2179 (1962).

ORGANICS DIVISION HANSJUERGEN SCHROEDER
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RECEIVED AUGUST 27, 1963

The Hydrogen Diiodide Anion[1]

Sir:

Previous attempts to prepare the hydrogen diiodide anion have resulted in black oils[2] or other products.[3,4] An extension of our synthesis of tropenium hydrogen dihalides[5] to the hydrogen diiodide likewise failed since tropenium ion is reduced by hydrogen iodide. We wish now to report the synthesis of tetrabutylammonium hydrogen diiodide, the first salt of this anion to be characterized.

Passage of hydrogen iodide over a stirred solution of tetrabutylammonium iodide in methylene chloride gives a yellow solution; addition of cyclohexane (saturated with hydrogen iodide) precipitates an oil which on repeated treatment with the same reagent crystallizes to yield 99.3% tetrabutylammonium hydrogen diiodide as brilliant yellow microneedles.

Anal. Calcd. for $C_{16}H_{36}NI$: HI, 0.00; I, 34.36. Calcd. for $C_{16}H_{37}NI_2$: HI, 25.72; I, 51.04. Found: HI, 24.99; I, 50.73.

The hydrogen diiodide dissolves in oxygen-free water to give strongly acidic yellow solutions. The crystals lose hydrogen iodide on heating or washing with acetone to yield the iodide. The hydrogen diiodide decomposes rapidly in the presence of light, oxygen, or moisture, but is reasonably stable in their absence; all manipulations were carried out as an oxygen-free drybox under red light.

Since there does not appear to be an opportunity for cation–anion charge transfer in this salt the yellow color of the compound must be ascribed to the anion.

Under similar conditions N-ethyl- and N-butylpyridinium iodides and tetrapropylammonium iodide failed to yield hydrogen diiodides.

(1) Supported by the Petroleum Research Fund and the National Science Foundation.
(2) F. Kaufler and E. Kuntz, *Ber.*, **42**, 2482 (1909).
(3) A. Hantzsch, *ibid.*, **64**, 667 (1931).
(4) G. J. Janz and S. S. Danyluk, *J. Am. Chem. Soc.*, **81**, 3850 (1959).
(5) K. M. Harmon and S. Davis, *ibid.*, **84**, 4359 (1962).
(6) Petroleum Research Fund—American Chemical Society Scholar, 1963.

DEPARTMENT OF CHEMISTRY KENNETH M. HARMON
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Book Review

Advances in Inorganic Chemistry and Radiochemistry. Volume 4. Edited by H. J. EMELÉUS and A. G. SHARPE, University Chemical Laboratory, Cambridge, England. Academic Press, Inc., 111 Fifth Ave., New York, N. Y., 1962. viii + 344 pp. 16 × 23.5 cm. Price, $11.00

This book consists of a set of six review papers, each of which might appropriately have been published in *Chemical Reviews*. Each article deals with a limited topic of considerable recent activity. The widely diverse areas treated emphasize the extent of modern inorganic chemistry. Five of the papers carry comprehensive outlines of contents, and probably the greatest value of the book resides in the extensive list of references for each chapter. The title, authors, and a brief statement of the content of each article are given below.

(1) "Condensed Phosphates and Arsenates" by Erich Thilo, 75 pages, 372 references. This chapter, dealing primarily with phosphates, describes the properties of many phases prepared in high temperature systems and discusses some structural bases for these various phases. (2) "Olefin, Acetylene, and π-Allylic Complexes of Transition Metals" by R. G. Guy and B. L. Shaw, 55 pages, 223 references. This is a catalog of the multitude of compounds prepared in recent years with transition metal atoms bonded to unsaturated hydrocarbon groups. The results of infrared spectroscopy, n.m.r., and X-ray diffraction are cited in discussing the nature of individual compounds. Complexes formed from cyclopentadiene and its derivatives, carbon monoxide, or aromatic compounds are not treated comprehensively in this review. (3) "Recent Advances in the Stereochemistry of Nickel, Palladium and Platinum" by J. R. Miller, 63 pages, 270 references. The stereochemistry of these elements, primarily in the 0, +1, and +2 oxidation states, is discussed with the consideration of recent X-ray diffraction results, spectroscopic studies, and recent developments in ligand field theory. (4) "The Chemistry of Polonium" by K. W. Bagnall, 33 pages, 137 references. This paper is the book's only real condescension to the "Radiochemistry" in its title since all nuclides of this element are radioactive and macroscopic studies invariably involve massive radiation effects. It does not deal primarily

with radiochemistry, however, but summarizes the definitive information which is now available about specific polonium compounds. Since the advent of nuclear reactors it is now feasible to prepare visible quantities of Po so the information presented is considerably more reliable than much of the old literature which was necessarily based on tracer-level studies. (5) "The Use of Nuclear Magnetic Resonance in Inorganic Chemistry" by E. L. Muetterties and W. D. Phillips, 62 pages, 139 references. The rapidly expanding literature into 1961 for n.m.r. applications to inorganic systems is reviewed. Limitations and pitfalls of the techniques are emphasized in discussions concerning chemical shifts and coupling constants, stereochemistry, and exchange phenomena. Applications to solids are discussed only briefly. (6) "Oxide Melts" by J. D. Mackenzie, 26 pages, 65 references. This final brief chapter deals with a correlation of the physical properties, viscosity, electrical conductance, expansivity, etc., at high temperatures in various molten oxide systems with the "structural" type, *i.e.*, molecular, ionic, or network liquids. Both pure component and binary borate and silicate systems are discussed.

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BOOKS RECEIVED

August 1, 1963–September 30, 1963

E. A. V. EBSWORTH. "Volatile Silicon Compounds." The Macmillan Company, 60 Fifth Avenue, New York, N. Y. 1963. v + 179 pp. $6.38.

N. P. GALKIN, A. A. MAIOROV, and U. D. VERYATIN. "The Technology of the Treatment of Uranium Concentrates." The Macmillan Company, 60 Fifth Avenue, New York, N. Y. 1963. xiv + 204 pp. $6.38.

C. T. MORTIMER. "Reaction Heats and Bond Strengths." Addison-Wesley Publishing Company, Inc., Reading, Mass. 1963. xii + 230 pp. $5.00.

INGVAR LINDQVIST. "Inorganic Adduct Molecules of Oxo-Compounds." Academic Press, Inc., 111 Fifth Avenue, New York 3, N. Y. 1963. vi + 129 pp. $6.50.

"The Naming and Indexing of Chemical Compounds from Chemical Abstracts." Chemical Abstracts Service, The Ohio State University, Columbus 10, Ohio. 1962. 98 pp. $5.00.

L. FOWLER, R. D. EANES, and T. J. KEHOE. "Analysis Instrumentation, 1963." Plenum Press, Inc., 227 West 17th Street, New York 11, N. Y. 1963. x + 261 pp. $12.50.

NOAH F. JOHNSON, EUGENE EICHLER, and G. DAVIS O'KELLEY. "Nuclear Chemistry (Technique of Inorganic Chemistry, Vol. II)." John Wiley and Sons, Inc., 605 Third Avenue, New York 16, N. Y. 1963. xiii + 202 pp. $8.00.

ERICH KRELL (E. C. LUMB, Editor). "Handbook of Laboratory Distillation." American Elsevier Publishing Company, Inc., 52 Vanderbilt Avenue, New York 17, N. Y. 1963. x + 561 pp. $18.00.

H. ELMER THOMAS. "German-English Dictionary of Glass, Ceramics and Allied Sciences." John Wiley and Sons, Inc., 605 Third Avenue, New York 16, N. Y. 1963. viii + 304 pp. $15.00.

C. F. BELL and K. A. K. LOTT. "Modern Approach to Inorganic Chemistry." Butterworths, Inc., 7235 Wisconsin Avenue, Washington 14, D. C. 1963. iii + 293 pp. $8.95.

GALEN W. EWING and E. GERALD MEYER. "Chemistry: A Survey of Principles." John Wiley and Sons, Inc., 605 Third Avenue, New York 16, N. Y. 1963. ix + 239 pp.

HAYM KRUGLAK and JOHN T. MOORE. "Basic Mathematics for the Physical Sciences." McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, N. Y. 1963. xi + 354 pp.

F. ALBERT COTTON, Editor. "Progress in Inorganic Chemistry." Vol. 5. John Wiley and Sons, Inc., 605 Third Avenue, New York 16, N. Y. 1963. 464 pp.

M. STACEY, J. C. TATLOW, and A. G. SHARPE, Editors. "Advances in Fluorine Chemistry." Vol. 3. Butterworths, Inc., 7235 Wisconsin Avenue, Washington, D. C. 1963. vi + 281 pp. $9.95.

Gmelins Handbook of Inorganic Chemistry, System No. 52, Chromium, Part B. Verlag Chemie, GMBH, Weinheim/Bergstrasse, West Germany. 1962. iv + lxxix + 942 pp., 74 graphs. $179.00.

Gmelins Handbook of Inorganic Chemistry, System No. 34, Mercury, Part A, Section 2. Verlag Chemie, GMBH, Weinheim/Bergstrasse, West Germany. 1962. iv + xi + 709 pp., 285 graphs. $133.50.

Gmelins Handbook of Inorganic Chemistry, System No. 9, Sulfur, Part B, Section 3. Verlag Chemie, GMBH, Weinheim/Bergtrasse, West Germany. 1963. iv + xlii + 745 pp., 245 graphs, separate pocket with 9 graphs. $153.00.

Additions and Corrections

1962, Volume 1

E. L. Muetterties and V. D. Aftandilian: Chemistry of Boranes. IV. Phosphine Derivatives of $B_{10}H_{14}$ and B_9H_{15}.

Page 732. In column 1, line 4 of the last paragraph, 1330 cm.$^{-1}$ should read 2330 cm.$^{-1}$.—E. L. MUETTERTIES.

1963, Volume 2

Fausto Calderazzo and Sergio Bacciarelli. The Cation Dicyclopentadienyldicarbonylvanadium(III).

Page 722. In column 2, line 7, 0.84 g. of I_2 (3.3 mg.-atoms) should read 0.84 g. of I_2 (3.3 mmoles). In Table I, I_2, mg.-atoms added should read I_2, mmoles added. All the figures were correctly calculated as mmoles of I_2.—FAUSTO CALDERAZZO.