ence for the initial mention or use of an idea or technique. The absence of references to United States or English work was sometimes equally surprising. Possibly the most important use of this translation will be to promote cross-fertilization of knowledge among distillation experts in various parts of the world.

The book should certainly be provided in every distillation laboratory, library, and course to supplement the other well-known distillation books, particularly as to approaches and procedures that might otherwise be overlooked.

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Boron Hydrides. By WILLIAM LIPSCOMB. W. A. Benjamin, Inc., New York, Amsterdam. 1963. vi + 258 pp. 16 × 24 cm. Price, $14.00.

In 1933 Alfred Stock published a monograph describing his classic research studies which has established the field of boron hydride chemistry. Tremendous growth in our knowledge of the descriptive chemistry of these substances has occurred in the past 30 years, largely owing to the studies of Schlesinger and Burg and their students and to the extensive program supported by the United States government in the period from 1952 to 1958. It is particularly fitting, however, that the first new book devoted to this field should be authored by the man whose work has laid a solid structural and theoretical foundation under much of the descriptive material.

Professor Lipscomb has approached his subject by a direct and detailed description of the structures of the known boranes and some of their derivatives. The student who has no background in this field may well be overwhelmed by the strange and apparently unrelated structures and might be well advised to read some of the more recent review articles before turning to the book.

The first three chapters of the book consist essentially of an integrated presentation of the studies carried out by Professor Lipscomb and his co-workers. Both structural studies and present bonding theory are described in detail as well as the "semitopological" treatment which provides the synthetic chemist with a useful guide for guessing structures of substances which have not as yet been subjected to a full structural study. Chapter Four describes the use of nuclear magnetic resonance for elucidation of the structures of boron compounds. Chapter Five presents a condensed summary of the descriptive chemistry of the boranes together with such structural and mechanistic correlations as are possible at our present stage of knowledge.

On the whole, the book is relatively complete and free from error.[1] There are a number of statements that may well make an expert in the field unhappy but at least in some instances errors in the literature have merely been carried along because corrections appeared too late to include in the present book. Thus, on p. 21 the ^{11}B resonance spectrum of $B_2H_7^-$ is said to show seven equivalent protons, whereas in fact newer work gives support to the suggested structure. Similarly, all nine lines of the ^{11}B spectrum of $B_3H_8^-$ have been observed in contrast to the statement of p. 128. In a discussion of the polymerization of diborane to higher boranes it is suggested that a reaction of possible importance may be

$$B_4H_{10} + B_5H_{11} \longrightarrow B_6H_9 + 2B_2H_6$$

which now seems unlikely to me despite the fact that it was my own suggestion. In the same discussion, one is left in considerable doubt as to the mechanism of polymerization beyond B_3H_9, whereas the evidence is quite strong for the sequence

$$B_3H_9 \xrightarrow[k]{} B_3H_7 + H_2$$

$$B_3H_7 + B_2H_6 \rightleftharpoons B_4H_{10} + BH_3$$

$$B_4H_{10} \xrightarrow[k]{} B_4H_8 + H_2$$

$$B_4H_8 + B_2H_6 \rightleftharpoons B_5H_{11} + BH_3$$

In general, however only the active research worker in the field will be bothered by such defects.

The reviewer considers it unfortunate that the symbols B^{11} and H^1 have been used instead of the internationally recommended ^{11}B and ^1H. American authors seem to resist adoption of what appears to be the more logical form but some of this reluctance may well be the responsibility of the professional editor. One might also have wished for a more complete collection of chemical shifts and coupling constants. Table 4-1 contains only about a quarter of the published information.

It seems highly regretable that more effort was not expended by the publisher to match the effort of the author. The figures in particular must have been prepared by an elderly, infirm draftsman. We are gradually beginning to observe more fine structure in the n.m.r. of boron compounds than had previously been suspected and the shaky drawings will leave the reader in doubt in many interesting cases. The binding of the book does not match its price and will not, I suspect, last long in the hands of an avid reader.

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(1) Professor Lipscomb has requested that one serious misprint be corrected. On p. 51, the third principle of the semitopological theory should read: "3. Define the excess negative connectability of a bond arrangement at the site of a given boron atom as the number of orbitals which it requires from that boron atom minus the number of other boron atoms that are connected to the given one by that bond arrangement. A bond arrangement may be several bonds considered as a unit."

Technique of Inorganic Chemistry. Volume I. Edited by H. B. JONASSEN, Tulane University, and A. WEISSBERGER, Eastman Kodak Co. Interscience Publishers, New York, N. Y. 1963. vii + 268 pp. 15 × 23 cm. Price, $9.50.

This is the first of a series of volumes designed "to present in a comprehensive manner the various techniques used specifically in inorganic chemistry and radiochemistry."

Volume I covers quite adequately six largely unrelated subjects. "The Determination of Formation Constants" (by S. Fronaeus) is divided into two major sections on the calculation of complexity constants and experimental methods. "Techniques with Nonaqueous Solvents" (by A. I. Popov) includes discussions of methods for the manipulation of liquefied gases, liquid–liquid extraction, ion exchange, and polarography, among others. "Fused Salt Techniques" (by J. D. Corbett and F. R. Duke) consists of major sections on equilibrium properties, dynamic properties, and spectra and diffraction. A relatively brief discussion on "Spectral Measurement in High-Pressure Systems" (by W. W. Robertson) includes a short section devoted to measurements above 10 kbars (by H. G. Drickamer). "The Use of Electrical Discharges in Chemical Syntheses" (by W. L. Jolly) covers both glow discharges and arcs. "Differential Thermal Analysis" (by W. W. Wendlandt) is concerned with details of instrumentation and with both the qualitative and quantitative applications of this technique; this discussion is noteworthy for its clear recognition of the shortcomings and limitations of the method.

It is perhaps to the credit of the editors that these discussions have two characteristics in common: they place quite considerable emphasis upon illustrations of specific equipment, and they are selectively and judiciously documented.

If the other volumes in the series measure up to the high standards set by Volume I, the authors, editors, and advisory board members will indeed render a distinctive service to the advancement of inorganic chemistry and radiochemistry.

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