In summing up his opinion, the reviewer realizes that much of what he has criticized could be claimed by the authors to be in conformity with present theoretical-cum-practical inorganic fashions, but surely it is their duty to be critical in their approach toward compartmentalized thinking and uncritical reproduction, since such a book will be read by the beginners in the subject. It is on such a basis that the criticism has been made.

DEPARTMENT OF CHEMISTRY THOMAS M. DUNN
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Annual Review of Physical Chemistry. Volume 14. Edited by H. EYRING. Annual Reviews, Inc., Palo Alto, Calif., 1963. 433 pp. 15 × 22 cm. Price, $8.50 (U. S. A., $9.00 elsewhere).

The latest edition in the Annual Review of Physical Chemistry series displays particularly well a balance between new directions and traditional domains of physical chemistry. The sixteen scientific chapters range from the physical organic chemistry of nucleophilic reactivity through electrolytic and nonelectrolytic solutions, heterogeneous catalysis, and polymers to infrared and n.m.r. spectroscopy, to low-temperature solution thermodynamics (really quantum liquids), to four chapters dealing with different aspects of solids (kinetics, superconductivity, lattice dynamics, and electronic spectra), and to fast reactions in solution, statistical mechanics, radiation chemistry, and molecular beams.

I was especially glad to see the chapter on molecular beams. The induction period for this field of research is clearly past, the basic hardware is developed and operating in several laboratories, and important results are appearing at an increasing rate. A review of a subject at this stage of its development serves the dual function of summarizing the work and exhibiting the subject itself to the attention of a new and broad audience. Fite and Datz have done a great service in fulfilling both these functions admirably.

The chapters on lattice dynamics and superconductivity also reflect new areas in which physical and inorganic chemistry is done. The former chapter contains a short and clear section on the Mössbauer effect, with a useful bibliography.

The chapter on nuclear magnetic resonance by S. Meiboom was one I particularly enjoyed reading, for the way each piece of work was put into a context and, frequently, discussed critically.

The editors have continued the policy of including one introductory chapter in the nature of a memoir. I, for one, applaud the policy. This year it is "Fifty Years of Physical Chemistry in Berkeley" by Joel H. Hildebrand. Hildebrand certainly gives a hard sell for Berkeley, and, as he does, he passes on some delightful stories and conveys a clear feeling for the atmosphere in which the department and its members developed. Written in as forthright and engaging style as this one, these introductory chapters could well be longer than the four pages allotted this year.

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Metallic Solid Solutions. By J. FRIEDEL and A. GUINIER. W. A. Benjamin, Inc., 2465 Broadway, New York 25, N. Y. 1963. xi + 660 pp. 16 × 24 cm. Price, $19.75.

This book is a compilation of a series of papers dealing with the electronic and atomic structure of metal solutions. The papers were presented at an international symposium held by the University of Paris at Orsay in July, 1962.

The volume is made up of 52 papers of varying length; some are very short and cryptic, 2 or 3 pages, while others run to as many as 38 pages. They have been printed in the order of their presentation and it is obvious that little if any editing has been attempted in order to make a coherent presentation. The structure of the book follows roughly the aim of the conference. Approximately three-fifths of the articles deal with electronic structure and related phenomena while the balance are concerned with short- and long-range order and Guinier–Preston zones.

This is not a book for practicing metallurgists but seems to be aimed at the knowledgeable theoretical metal physicist. A few articles are based on experimental data, others are essentially literature reviews, while others are speculation or calculations based on new approximations for the solution of the many-bodied problem. Throughout the many papers the casual reader will encounter the annoying tendency to substitute names of workers in the field for phenomena or theories. The Kohn anomaly, the Ruderman–Kittel exchange, Fletcher's band structure, the Kuhlman–Wilsdorf reaction are just a few of what could be an extensive list. Perhaps to workers in these fields these names sufficiently describe various concepts; it must since it is so endemic to the field, but if one hopes to reach a wide audience or a receptive audience this has the opposite effect.

One wonders why such a book is ever published since the articles, if really significant, would probably appear in the literature after having been subjected to a critical review. When published in book form without this review the reader, unless he himself is expert, is hard put to separate the significant from the inconsequential.

DEPARTMENT OF METALLURGICAL ENGINEERING M. J. SINNOTT
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Handbook of Laboratory Distillation. By ERICH KRELL. Edited by E. C. Lumb. American Elsevier Publishing Co., Inc., 52 Vanderbilt Ave., New York 17, N. Y. 1963. x + 561 pp. 36 × 54 cm. Price, $18.00.

There is not a word about the distillation of inorganic substances in this book, except for a ten-page treatment of isotope separation. But where would one look for a treatment of the distillation of inorganics? The same two sentences can be written with "metallo-organics" substituted for "inorganics." For specific information on such materials an investigator must go to the original or specialized literature, which, except for an occasional mention in one of the annual reviews on distillation, has not been adequately indexed since the last volume of "Distillation Literature, Index and Abstracts for 1953–54."

As compared with other books currently available on laboratory distillation, Krell is intermediate in length and detail of treatment. In the basic areas the treatment is good, though not outstanding, and in general tends to be lengthy and detailed, which is of some advantage for the uninitiated. For those who are versed in the art, the tendency toward wordiness may increase hop and skip reading so much as to cause missing the unique and useful ideas that are present. In general, the symbols and terminology are conventional and will cause no difficulty to a United States reader. There is a good glossary and a satisfactory index.

The unique feature of the book is that it tells how the Germans and other Europeans approach and perform distillation. There is much of interest in the way of laboratory-built and commercially obtainable equipment and accessories that are available abroad. The initial portion of the book has an excellent historical summary. Cleopatra is mentioned. There is a nice collection of figures, which include comparisons of ancient and modern apparatus. As mentioned earlier, the treatment of isotope separation is relatively extensive, but still can serve only as an introduction to this specialized type of distillation. There is more detailed treatment of laboratory continuous distillation than in other available literature.

Of special interest to this reviewer were the number of instances when a non-English reference could be found and cited as an alternate to the customary United States or English reference 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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ARTHUR ROSE

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 ^{1}H. 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.

DEPARTMENT OF CHEMISTRY
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RILEY SCHAEFFER

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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(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."