ers his specialty. For, example, in the crystal growth section, we find: "Model Studies of Crystal Growth Phenomena" by R. C. Sangster; "Czochralski Technique" by R. Gremmelmaier; "Floating Zone" by W. P. Allred; "Gradient Freeze" by S. E. Miller; "Horizontal Zone Melting" by J. L. Richards; "Vapor Phase Reactions" by G. R. Antell; and "Dendritic Growth" by O. Lindberg and J. W. Faust, Jr.

The writing in the whole volume is immensely practical and corresponds roughly to the comprehension level of a chemistry major in his senior year of college. Perhaps more worthwhile is the fact that many of the articles are illustrated with exceptionally clear line-drawings of equipment.

This volume could well be placed in all solid state libraries. Unfortunately, its high price will exclude it from most individual collections. It is too bad that some device cannot be found whereby industrial corporations and research institutes could help subsidize publications such as these—perhaps in exchange for a page or two of recruitment information. As it stands, this book will probably not be seen by those who could use it the most.

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Vapour Pressure of the Elements. By AN. N. NESMEYANOV. Translated and edited by J. I. Carasso. Academic Press Inc., 111 Fifth Ave., New York 3, N. Y. 1963. vi + 469 pp. 16 × 24 cm. Price, $14.50.

This book, originally published in Russian in 1961, presents a review of methods for measuring vapor pressures and a detailed discussion of available vapor pressure data for the chemical elements, except for hydrogen, nitrogen, oxygen, and the inert gases. The translation is well done and the quality of the paper and of the printing are excellent.

Tables of most of the original data are given along with a critical evaluation. All of the available data plus a "best" choice are plotted on a log P *vs.* $1/T$ graph and utilized for preparation of reference tables giving pressures at 50° temperature intervals and temperatures at which certain pressures are attained. The data have been fitted to the equation $\log P_{mm} = A - B/T + CT + D \log T$, and the coefficients are tabulated. Heats of sublimation at 0 and 298°K. are presented but no thermodynamic functions are tabulated.

Since a number of reviews of thermodynamic properties of the elements, including vapor pressures, have recently been published,[1-4] one must ask how this book is unique. Obviously, it is already 3 years out of date and most of the elements for which no data were available in 1960 (Rh, Pd, Os, Ir, or Hf, for example) have now been well studied. There have been several other recent reviews of vapor pressure methods but probably nowhere else, in English, is such a thorough description (26 pages) of the isotope exchange method developed by Nesmeyanov and his associates. Many of the important modern developments are treated very briefly; for example, high temperature mass spectrometry is covered in one page.

An interesting comparison of ΔH°_{298} for sublimation as chosen by Nesmeyanov, by Stull and Sinke,[1] and by Honig[2] is given in Table III in the Appendix. Certain outstanding discrepancies pinpoint areas where further research is badly needed. For example, discrepancies among the selected heats of sublimation are 17–22 kcal./mole for Nb, 19 kcal./mole for Co, 20 kcal./mole for Ni, and 14 kcal./mole for Si even though each of these elements has been extensively studied. Low evaporation and/or condensation coefficients account for the problems and new work (1961–1963) has resolved some of these. Their mere existence in 1960 emphasizes the possibility of other major changes in heats of sublimation as refined experiments reveal more about the kinetics of evaporation and condensation. Differences of 2–5 kcal./mole are common (B, Al, Au, Sc, Bi, Se, etc.). Agreement among the three authorities to ±1 kcal./mole was found for about 40 elements. Widely discrepant estimates for Ra, At, Tc, and Pa are listed.

In summary, the book is mainly useful as a reference to the literature before 1960 or for vapor pressures as f(T) based on this literature. Equivalent recent references, written originally in English, are available and usually include complete thermodynamic functions as well as vapor pressures.

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(1) D. R. Stull and G. S. Sinke, "Thermodynamic Properties of the Elements," Advances in Chemistry Series, No. 18, American Chemical Society, Washington, D. C., 1956.

(2) R. M. Honig, *RCA Rev.*, **23**, 567 (1962).

(3) R. Hultgren, R. L. Orr, P. D. Anderson, and K. K. Kelley, "Selected Values of Thermodynamic Properties of Metals and Alloys," John Wiley and Sons, New York, N. Y., 1963.

(4) For selected elements, the JANAF Thermochemical Tables, D. R. Stull, Ed., The Dow Chemical Company, Midland, Mich.

Friedel-Crafts and Related Reactions. Volume I. General Aspects. Edited by GEORGE OLAH. John Wiley and Sons, Inc., 605 Third Ave., New York 16, N. Y. 1964. xxxiv + 1031 pp. 14.5 × 22.7 cm. Price, $29.50.

This book, the first of four volumes dealing with the Friedel–Crafts reaction, contains much that could be of interest to an inorganic chemist. The entire set is intended to be a comprehensive treatise on one of the more important organic reactions. The first volume, which is subtitled "General Aspects," is more concerned with solvents, catalysts, and their interaction with organic substrates than with preparative organic chemistry. Most of the descriptive organic chemistry is found in the second chapter in which the scope of the Friedel–Crafts reaction is defined. The editor, George Olah, has been very prolific, having authored or coauthored five of the thirteen chapters in this volume. His contributions greatly add to the continuity of this volume and also cover some of his own work on stable carbonium ions.

Since a Friedel–Crafts reaction is defined as taking place under the catalytic effect of a Lewis acid type acidic halide or proton acid, a considerable portion of this volume is devoted to Brønsted and Lewis acids. The subject is ably introduced in Chapter III by R. J. Gillespie, who has written an excellent short review on these two concepts of acidity. A comparison of the Brønsted and Lewis definitions of acidity is emphasized and pertinent examples are included. The behavior of Lewis acid metal halides in nonaqueous donor solvents is the subject of Chapter V. The question of solvation and/or ionization is carefully described and a comparison of the halide ion donor and acceptor strength of various metal halides is also included. Adduct formation between the trihalides of boron, aluminum, and gallium and a wide variety of Lewis bases is rather completely documented in Chapters VI and VII. The chapter entitled "Intermediate Complexes" by Olah collects together information on a large number of metal halide–organic substrate systems in which complexation has been observed. Typical organic substrates are acyl halides, alkyl and aryl halides, aromatics, olefins, and ketones or aldehydes. Structural information is given when available. The next chapter, which is on spectroscopic methods, describes the use of infrared spectroscopy in studying the structure of some acyl halide–metal halide complexes. A discussion of the identification of the nitronium ion in various systems by spectral methods is also included.

In general the book is well written and reasonably free from errors. The sections briefly mentioned above should be of value to inorganic chemists, especially those interested in adduct formation. References to the original literature are numerous.