editor and eight of the authors are from the Linde Company Laboratories. Their contributions have been supplemented by those from workers in university and government laboratories and the publishing business. The backgrounds of these individuals include physical chemistry, physics, technical librarianship, nuclear engineering, chemical engineering, biochemistry, business administration, and petroleum engineering. In addition to discussions of fundamental properties, the books include such diverse topics as physiological effects, applications to arc welding, and illuminated signs. With the possible exception of an occasional reviewer, it is unlikely that anyone will undertake to read the entire two volumes since there are a number of unrelated topics. As a corollary to the previous statement, it should be apparent that it is unlikely that any single reviewer, and certainly not the present one, could comment on the entire book with uniform authority.

Volume I will perhaps be of most use to physical chemists and physicists. It contains chapters on the history, occurrence and origin, and nuclear structure. Although the book was written before the discovery of the xenon and krypton fluorides, there is an interesting chapter on ion chemistry, clathrates, and mixed crystals. A chapter on atomic structure and spectra contains a large number of useful energy-level diagrams and extensive tables of energy levels, polarizabilities, oscillator strengths, etc.

There are two chapters on gas phase properties, one concerned primarily with transport phenomena, the second with volumetric and thermodynamic behavior. There is a long chapter on liquid and solid state properties and a final chapter summarizing physical properties. In all four of these latter chapters the authors have done a good job of surveying the literature and selecting the most likely values for properties. These results are reported in carefully prepared tables and figures. Volume II contains much more technology, although the chapters on phase equilibria, analytical determinations, and physiological effects will be found in this section.

These two volumes are lengthy and expensive, and therefore one has to question the wisdom of the inclusion in the chapter on atomic structure of approximately 23 pages of introductory discussion of spectra and quantum chemistry in general. There is an equally luxurious 3-page exposition on general thermodynamics of the critical region in the chapter on thermodynamic properties of the gas phase. The chapter on cryogenic applications appears to be primarily qualitative discussions of information which appeared in previous chapters on liquid or gaseous state properties, or which could be found in standard references on experimental low-temperature physics. In these instances and several others, the book could have been shortened and made more readable by reference to standard works and by somewhat more ruthless editing.

The editor asserts in the preface that special effort has been made to give all units and conditions clearly, an objective which has been generally attained. However, in the chapter on liquid and solid state properties, units are repeatedly denoted in footnotes to the tables, with powers of 10 attached to the units in such a manner that the reader has to ponder whether the tabulated value is to be, or already has been, multiplied by the indicated power of 10. In both Fig. 1 and Table XXIX of Chapter VII, units are not stated for the diffusion coefficient, although one infers that they are cm.^{2}/sec.

There are some errors and points of ambiguity. On pages 252, 253, 306, and 307 there is inadequate distinction made between the coefficients of the virial equation of state for a gas and the coefficients of empirical equation of state; the unwary reader could easily infer erroneously that empirical equation of state coefficients could be "——expressed in terms of intermolecular potential functions by means of statistical mechanics." On page 319 an incorrect formula is given relating the interatomic distance to the characteristic lattice constant for the face-centered cubic lattice. On the same page the assertion is made that at, 0°K., the interatomic distance in the lattice is expected to be equal to the distance of minimum energy in the intermolecular potential function, thus ignoring all interactions except with nearest neighbors. On page 365, in a discussion of the isothermal compressibilities of the solid inert gases, the following statements appear: "The values at zero pressure in Table XI are about 10 times larger than similar values for other substances (*e.g.*, K_T is about 30×10^{-11} cm.^{2} dyne^{-1} for sodium chloride). The great compressibility of the inert elements is a consequence of the weakness of the van der Waals forces between the atoms." This is really a curious mixture of confusion: a number of substances, for example, rubidium and cesium, have isothermal compressibilities comparable to those of the inert gases; the given value of K_T for sodium chloride is incorrect and, as a matter of fact, as stated negates the claim of the sentence; the second sentence is certainly incorrect if it implies that the van der Waals forces between the inert gases are weaker than van der Waals forces between most other atoms, although, of course, van der Waals forces in general are many orders of magnitude less than the ionic forces acting in a substance such as sodium chloride. On page 373, in a discussion of the structure and radial distribution function of liquids, there appears the statement, "The X-ray and neutron experiments agree quite well with each other." This is simply not the case, at least for liquid argon.

One of the very useful features of the book is Table I of Chapter X, which is a summary of the physical properties of the inert gases. However, this might be approached with some caution. It was found on cursory examination that the tabulated value for the viscosity of liquid argon is in error by a factor of 1000, and that the reported value for the thermal conductivity of liquid helium appears to disagree somewhat from the best value reported in the preceding chapter on liquid state properties.

There are unfortunate omissions of work on physical properties. The authors include no values for the coefficient of thermal expansion or for Poisson's ratio for solid argon, although both are available in the literature. Interesting studies of the heat capacity of fluid argon by Jones and Walker and measurements of sound absorption of xenon near the critical state by Schneider are not mentioned. The chapter on phase equilibria seems superficially done compared to the previous chapters on properties.

In spite of some shortcomings and the indicated errors, these two volumes still constitute a worthwhile work. However, a reader interested in the properties of the rare gases would be well advised to not to forsake Din, Hilsenrath, Rowlinson, and the classic review paper by Dobbs and Jones. Cook's volumes should stimulate further work on the inert gases. One hopes, in turn, that the editor and authors might, at an early date, prepare a revised edition, hopefully somewhat more critically written and more tersely edited.

CALIFORNIA INSTITUTE OF TECHNOLOGY C. J. PINGS
PASADENA, CALIFORNIA

BOOKS RECEIVED

February 1–April 1, 1963

F. A. COTTON, Edited by. "Progress in Inorganic Chemistry." Vol. 4. Interscience Publishers (Division of Wiley), 440 Park Ave. South, New York 16, N. Y. 1962. 540 pp. $15.00.

R. B. HAHN AND F. J. WELCHER. "Inorganic Qualitative Analysis." D. Van Nostrand Co., Inc., 120 Alexander St., Princeton, N. J. 1963. 294 pp. $4.95.

J. KLEINBERG, Edited by. "Inorganic Syntheses." Vol. VII. Inorganic Syntheses Series, McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. 1963. 253 pp. $8.95.

J. H. SAUNDERS AND K. C. FRISCH. "Polyurethanes/Chemistry and Technology. High Polymers." Vol. XVI, Part I. Interscience Publishers (Division of Wiley), 440 Park Ave. South, New York 16, N. Y. 1962. 353 pp. $14.00.

W. A. WEYL AND E. C. MARBOE. "The Constitution of Glasses." Vol I. Interscience Publishers (Division of Wiley), 440 Park Ave. South, New York 16, N. Y. 1963. 417 pp. $16.00.