reference cited disproves. There is also a certain lack of critical judgment in some places where it appears called for. As an example, in discussing dinitrogen difluoride (p. 102), the statement is made that it exists as *trans*-1,2-difluorodiazine and 1,1-difluorodiazine. It is further stated that (reference cited). . . "has confirmed these structure by infrared spectra." Granted that N_2F_2 is a simple compound; the use of the word "confirmed" nevertheless reveals, in the reviewer's opinion, an overly sanguine view of what can generally be accomplished with infrared methods. It is worth noting that recent microwave spectral and electron diffraction studies strongly indicate that the second N_2F_2 isomer is *cis*-1,2-difluorodiazine.

Part IV of the book consists of appendices: character tables, *F* and *G* matrix elements for simple molecular types, an outline of a normal coordinate analysis of metal acetylacetonates, a wave length to wave number conversion table, and group frequency correlation charts.

Despite whatever critical comments I have felt compelled to make, I do feel that Nakamoto has written an excellent book which deserves wide use. An abundance of tables and diagrams adds greatly to the book's utility as a reference source. Any chemist who makes use of infrared spectroscopy will find this volume a valuable addition to his bookshelf.

UNIVERSITY OF ILLINOIS THEODORE L. BROWN
URBANA, ILLINOIS

Inorganic Syntheses. Volume VII. Edited by JACOB KLEINBERG. Inorganic Syntheses Series, McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, N. Y., 1963. xi + 253 pp. 15 × 23.5 cm. Price, $8.95.

"Inorganic Syntheses," Volume VII, contains 65 independently tested and checked preparations. Only ten of these represent alternative procedures for preparing compounds previously listed in earlier volumes of the series. The editor appears to have maintained the high standards set by his predecessors. Format and general organization employed in previous volumes have been retained. Chapter headings are the Mendeleev periodic subgroups. The placement of compounds in chapters is determined by the principal element in the compound. Author, formula, and subject indexes are cumulative. A total of 454 syntheses are listed for the entire series.

While the transition metals are represented predominantly by classical complexes in Volume VII, preparations are also given for some cyclopentadienyl carbonyls and their derivatives, triiron dodecacarbonyl, and sodium salts of carbonyl hydrides. Of the representative elements noteworthy preparations of compounds of gallium, indium, silicon, germanium, phosphorus, and sulfur are listed. Syntheses of isotopically labeled Na_2S^{35}, S^{35}, NaF^{18}, H^2Cl^{36}, $SOCl_2^{36}$, $SiCl_4^{36}$, BCl_3^{36}, $GeCl_4^{36}$, PCl_3^{36}, $Fe^{55,59}(C_2H_5)_2$, and $Fe^{55,59}(C_2H_5)_2^+$ are given also.

Volume VII represents a useful addition to the "Inorganic Syntheses" series.

DEPARTMENT OF CHEMISTRY SHELDON G. SHORE
OHIO STATE UNIVERSITY
COLUMBUS 10, OHIO

Solubility Constants of Metal Oxides, Metal Hydroxides and Metal Hydroxide Salts in Aqueous Solution. Edited by W. FEITKNECHT and P. SCHINDLER. International Union of Pure and Applied Chemistry. Butterworths, London, England, 1963. v + 69 pp. 15.5 × 24.5 cm. Price, $2.25.

Several years ago a project was undertaken by a Subcommission of the Analytical Section of I.U.P.A.C. to compile literature data on solubility products of inorganic substances and stability constants of metal ion complexes.

The present monograph is an extension of this work. The critical survey of solubility data in aqueous solution of metal oxides, metal hydroxides, and metal hydroxide salts includes the following members of the periodic table: Be, Mg, Ca; Sc, Y, and the rare earths; Ti, Zr, Hf, Th; Cr, Mn, Fe, Co, Ni; Cu, Ag, Au; Zn, Cd, Hg; Al, Ga, In, Tl; Sn and Pb. In several cases where the substance exists in more than one form, solubility data are given for each form. In some cases, also, data are given for more than one oxidation state of the metal. The monograph should be quite useful not only as a reference for solubility data, but also in setting a pattern for reporting such data.

DEPARTMENT OF CHEMISTRY MILTON TAMRES
UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN

Nonstoichiometric Compounds. Advances in Chemistry Series, No. 39. ROLAND WARD, Symposium Chairman. American Chemical Society, 1155 Sixteenth Street, N.W., Washington 6, D. C., 1963. vii + 253 pp. 15.5 × 23.5 cm. Price, $7.00.

This volume is a collection of papers presented at the symposium on nonstoichiometric compounds sponsored by the Division of Inorganic Chemistry at the American Chemical Society meeting in March, 1962, at Washington, D. C. All of the papers, including review papers by A. D. Wadsley, G. G. Libowitz, J. S. Prener, and M. J. Sienko, were invited. In addition, J. S. Anderson contributed a more general survey on "Current Problems in Nonstoichiometry" as the introductory paper. Twenty-three papers, ranging in length from six to fourteen pages, comprise the volume.

A wide range of phenomena and structural concepts can be included under the heading of nonstoichiometric compounds, and a good sampling of this variety is found in this symposium. Anderson's opening paper deals with the problems associated with a thermodynamic treatment of defect structures. Wadsley's paper on the metallic oxides points out relationships between the crystal structures of some nonstoichiometric phases and the structures of chemically similar substances of fixed composition in which the different phases are ordered and identifiable. In a paper on the metal hydrides, Libowitz describes an attempt to interrelate the interaction energy of hydrogen vacancies, the hydrogen content, and the equilibrium pressure of hydrogen above a hydride. Prener takes up the chalcogenides and outlines a statistical thermodynamic theory for predicting the equilibrium concentration of lattice defects. His paper includes a review of crystal structure data on the chalcogenides. Sienko's paper is primarily devoted to the transport and magnetic properties of the tungsten and vanadium bronzes, and these properties are discussed in terms of a band model. Each of these review papers provides an excellent summary of the current situation in the particular area of nonstoichiometric compounds. Shorter but equally authoritative reviews are contributed by L. Kihlborg on molybdenum oxides, by L. E. J. Roberts on fluorite-type oxides, and T. R. P. Gibb on metal hydride models. The remaining fifteen papers, of a total of 23, report new research results.

The value of such a collection of symposium papers may be questioned on several counts, none of which relates to the nature or quality of the papers themselves. First of all, for whom are such publications intended? This volume, and several others in the Advances in Chemistry series, strike me as being too advanced and parochial to serve as a good introduction or survey for one just entering the field or for the casual seeker of information. On the other hand, a person active in this particular area of inorganic chemistry finds that the time lapse between the symposium and the publication of the papers, over a year in this case, makes the volume of relatively minor use. Happily, some of the authors have compensated somewhat for the delay by including later information and by making revisions on the basis of the discussions at the symposium.