

My second complaint is that volumes in this series are much too expensive. This one, at seven dollars, is simply not worth the price to either experts or neophytes in the field. I question whether it is worthwhile to make such an elaborate production of a symposium volume. Even though paper-bound, this one is handsomely set in type and printed on coated paper. Could production time be saved and prices reduced by using photo-offset or some similar method of reproduction? Symposium collections are most valuable when published as rapidly and cheaply as possible.

Finally, I would point out that more than one-third of the papers in this symposium are reports of new research results, rather than being reviews or surveys of some aspect of the symposium topic. While one can defend the practice of including such papers in a symposium, I feel that their *publication* is more appropriate in the regular journals.

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Progress in Inorganic Chemistry. Volume 5. Edited by F. A. COTTON. Interscience Publishers, Division of John Wiley and Sons, Inc., New York, N. Y., 1963. 464 pp. 15 × 2.23 cm. Price, \$14.00.

Discussed in this volume are four topics: dinitrogen trioxide by I. R. Beattie, phosphines by L. Maier, polarography of coordination compounds by A. A. Vlček, and the coupling of vibrational and electronic motions in molecules (part III) by A. D. Liehr.

Beattie's chapter on dinitrogen trioxide is a 26-page review of the history, preparation, and physical properties of this substance. Included is an interesting account of how several early investigators were led to suppose that nitric oxide and nitrogen (IV) oxide do not react with each other because on mixing the two gases there occurred no change in pressure. It is stated that the only reliable preparation of an equimolar mixture of nitric oxide and nitrogen(IV) oxide involves mixing nitric oxide with a calculated quantity of dry nitrogen(IV) oxide or oxygen. Several methods for obtaining pure nitric oxide are given; not listed is perhaps one of the simplest methods: passing tank nitric oxide through narrow-annular traps cooled to -140° . The questionable " π -only" description of the nitrogen-nitrogen bond in dinitrogen trioxide is given. Physical properties discussed include the equilibrium constant for the reaction $N_2O_3 \rightleftharpoons NO + NO_2$, freezing point and vapor pressure data, infrared and raman spectra, ultraviolet spectra, and thermodynamic functions at 25° .

Maier's long, 167-page chapter on phosphines is a well-organized, thorough review of the literature from 1950 through March, 1962, on the preparation and reactions of primary, secondary, and tertiary phosphines. Included are extensive tables listing methods of preparation and physical properties (melting points and boiling points, refractive indices, and densities). To the reviewer's surprise, the greater nucleophilicity of phosphines compared to amines is attributed to mainly steric effects in the amines. On the whole the author succeeds in presenting in an efficient and readable manner a large body of information. The chapter is documented by over 500 references, many to the foreign literature.

Vlček's 168-page chapter on the polarographic behavior of coordination compounds is an interesting blend of facts, experimental methods, and theory. The imagination, vigor, and thoroughness with which workers in this field have pursued an obviously complex phenomenon are presented in considerable detail. Not infrequently the discussion assumes a knowledge of the special theory and techniques of polarography greater than that possessed by the reviewer (not much!). Happily, there are included a generous number of illustrative examples, many of

which may interest a broad spectrum of inorganic chemists. Section headings are: Electrode Behavior of Metal Complexes, Mechanism of the Electrode Reaction, Type of Experimental Information, The Electrode Reaction Proper, Reactions Preceding Electrode Reaction Proper, Products of Electrode Reactions, Relations between the Structure and Electrode Behavior of Complexes. Probably the section of most general interest is the last section. There the author discusses how polarography can contribute to our understanding of chemical bonding by determining through a systematic study of the effects of structural changes on the polarographic behavior of complex compounds the "localization of electron changes."

Liehr in a 43-page chapter continues his now-often seen, but for this no less remarkable treatment of the potential energy surfaces of molecular systems of assumed high symmetry. Molecules are classified into groups according to the number of identical nuclei they contain and to each group is assigned the highest possible nuclear symmetry, irrespective of the number of valence-shell electron pairs present in the member molecules. Under "Trigonal Molecules," for example, are listed H_3 , C_3 , O_3 , and I_3^- ; under "Tetragonal," H_4 , C_4 , P_4 , ICl_4^- , and $PtCl_4^{-2}$. "It is to be emphasized," the author states in a parenthetical passage, "that all our discussion has been based on permutational symmetry principles alone, and not on any particular mode of chemical bonding. Therefore, our results are perfectly general and in no ways approximate." But, just between us chemists, what can we do with these results? Very little. The author's excursions from the actual equilibrium configurations of molecules are usually so great that it is impossible to obtain reliable numerical values for the parameters in his theory. Nature, he concludes at one point, is innately perverse.

This volume will probably find its chief use among chemists interested in either phosphines or the polarography of coordination compounds. It contains a cumulative index for Volumes 1-5.

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BOOKS RECEIVED

December, 1963

- HANS B. JONASSEN and ARNOLD WEISSBERGER. "Technique of Inorganic Chemistry." Volume I. John Wiley and Sons, Inc., 605 Third Avenue, New York 16, N. Y. 1963. vii + 268 pp. \$9.50.
- HANS B. JONASSEN and ARNOLD WEISSBERGER. "Technique of Inorganic Chemistry." Volume III. John Wiley and Sons, Inc., 605 Third Avenue, New York 16, N. Y. 1963. vii + 345 pp. \$11.50.
- GEORGE A. OLAH. "Friedel-Crafts and Related Reactions" Volume I. "General Aspects." John Wiley and Sons, Inc., 605 Third Avenue, New York 16, N. Y. xxxiv + 1031 pp. \$29.50.
- E. CARTMELL and G. W. A. FOWLES. "Valency and Molecular Structure." Butterworths, Inc., 7235 Wisconsin Avenue. Washington, D. C. 1961. xii + 294 pp. \$7.00.
- ROGER LAURENCE WILKINS. "Theoretical Evaluation of Chemical Propellants." Prentice-Hall, Inc., Englewood Cliffs, N. J. 1963. xiv + 463. \$15.00.
- FREDERICK A. LOWENHEIM. "Modern Electroplating." Second Edition. John Wiley and Sons, Inc., 605 Third Avenue, New York 16, N. Y. 1963. xvi + 769 pp. \$16.00.
- CARSON D. JEFFRIES. "Dynamic Nuclear Orientation." Interscience Tracts on Physics and Astronomy, No. 23. Interscience Publishers, Division of John Wiley and Sons, Inc., 605 Third Avenue, New York 16, N. Y. 1963. vii + 177 pp. \$5.95.