Book Review

Progress in Inorganic Chemistry. Volume 6. Edited by F. ALBERT COTTON. Interscience Publishers, New York, N. Y. 1964. 350 pp. 16 × 24 cm. $14.00.

This volume measures up to earlier members of the series in presenting careful, analytical treatments of a well-chosen variety of topics having considerable current interest. It consists of "Reactions of Metal Halides with Ammonia and Aliphatic Amines" by G. W. A. Fowles, "The Magnetic Properties of Transition Metal Complexes" by B. N. Figgis and J. Lewis, "Reactions of the Noble Gases" by John H. Holloway, and "The Coordination Model for Non-Aqueous Solvent Behavior" by R. S. Drago and K. F. Purcell.

Of the four articles, the first, that by Fowles, is the most specialized. It deals exclusively with the solid compounds formed by reaction of ammonia, or amines, with metal halides. Two types of reaction are considered: ammonation, or adduct formation, to give products of the type $MX_n \cdot yNH_3$; and solvolysis to give products of the type $MX_{n-y}(NH_2)_y$. The article describes the composition of the large number of compounds so formed, organized according to groups in the periodic table. Properties such as crystal structures, spectra, reactivities, and species in solution are but briefly mentioned.

The bulk of the volume (over 200 pages) is devoted to the Figgis and Lewis article. This article on magnetism of the transition elements certainly justifies the space devoted to it and represents an outstanding contribution. It is an excellent example of what a review article should be. The article begins with a theoretical introduction to paramagnetism, which occupies about one-third of the total length and contains a concise but thorough treatment of atomic energy levels, coupling schemes, ligand fields, magnetic anisotropy, and antiferromagnetism. The remainder of the article surveys the magnetic data for transition element complexes. Despite the extensive amount of data which have been efficiently included, the authors were forced to be somewhat selective when covering complexes of the first-row transition elements. They have chosen, successfully I believe, to include examples whose interest is primarily chemical rather than purely magnetic, and have, for example, omitted some results on "magnetically concentrated" systems. Their coverage of the heavier elements is as complete as one could hope for at this time. Lanthanide and actinide elements are not dealt with. The treatment is interestingly written and is fully documented by 670 references.

Holloway has critically summarized the recent developments in noble gas chemistry. His concise style is well suited to the coverage of all aspects of the subject while conveying some of the excitement which has accompanied the rapid development of the field. This sense of immediacy is aided by his "note added in proof" containing four late references including the preparation of XeO_4.

The concluding article by Drago and Purcell on solvent coordination differs from the other articles in that its primary aim is to substantiate a point of view—the coordination model for solvent behavior. In seeking to accomplish this aim, the authors are most successful in pointing out the shortcomings of the solvent system concept. They, however, run the risk of oversimplification by presenting an equally broad generalization, although one which must be more widely acceptable. The primary virtue of the coordination description is the fact that it focuses attention on the nature of solvated species. Unfortunately, our knowledge of such species is usually too slight to allow their detailed formulation. In particular, the explicit assumption of constant coordination number, the simplification of the complexities of ion pairing, and the likelihood of more extreme complications, such as a multiplicity of complexes and solvolytic polymeric species, point up the fact that no simple model is likely to solve the many problems remaining for the experimental solution chemist.

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BOOKS RECEIVED

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MICHAEL ARDON. "Oxygen." W. A. Benjamin, Inc., 1 Park Ave., New York, N. Y. 1965. v + 106 pp. $6.75.

JAMES GREEN and JOHN LEE. "Positronium Chemistry." Academic Press Inc., 111 Fifth Ave., New York 3, N. Y. 1964. v + 105 pp. $5.50.

EDWIN M. LARSEN. "Transitional Elements." W. A. Benjamin, Inc., 1 Park Ave., New York, N. Y. 1965. v + 183 pp. Hardback, $4.95; paperback, $2.45.