SYMPOSIUM ON COMPLEX INORGANIC COMPOUNDS[1]

INTRODUCTION TO THE SYMPOSIUM

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The coördination theory was originally proposed to account for the peculiar stability and properties of the metal ammines. It was quickly seen, however, that the theory had many other applications, and through the passing years its implications have been extended to an ever-widening field. Sidgwick's (9) modernization of the theory in terms of electronic structure has greatly accelerated this trend in recent years. The tendency to form coördinate compounds is, indeed, one of the most fundamental properties of both organic and inorganic molecules. Morgan and Burstall's recent review of modern developments in inorganic chemistry (5) lists stable coördination compounds of nearly every element in the periodic table. The "complex" compounds studied by Werner and the other early workers are simple indeed compared with the coördinate molecules now under investigation. For example, the recent studies of Reihlen and his coworkers (7) have established the fact that the heavy metal cyanides are polynuclear substances of very high molecular weight, while the studies of Brintzinger and his associates (3) have shown that many of the common complex ions act as nuclei for "super-complex" ions.

The rapid growth of the field of coördination compounds and the great interest which the symposium[2] held in 1936 elicited made it seem wise to arrange another symposium this year. The first paper in this symposium —"The Volatile Metal Carbonyls"—is presented by Professor Arthur A. Blanchard of The Massachusetts Institute of Technology. He has studied these compounds for many years, and his researches have contributed greatly to our knowledge of them. In the second paper Dr. Harvey Diehl

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[1] Held by the Division of Physical and Inorganic Chemistry at the Ninety-third Meeting of the American Chemical Society, Chapel Hill, North Carolina, April 14, 1937.

[2] The papers presented at the former symposium were the following: "The Hydrogen Bond and Coördination," by W. H. Rodebush (8); "The Acid-Base Properties of Complex Ions," by N. F. Hall (4); "The Stereochemistry of Complex Inorganic Compounds," by John C. Bailar, Jr. (1); and "Polyhalides," by H. S. Booth.

of Cornell University discusses "The Classification of Chelate Rings", a subject of enormous importance to analytical chemists as well as to those interested purely in the theory and mechanism of coördination.

Bjerrum (2) found in 1907 that heating basic chromic sulfate solutions caused polymerization, and advanced the theory of "olation", which has since been greatly extended. The studies of Professor A. W. Thomas and his students at Columbia University have indicated that colloidal oxide particles are really giant coördination molecules formed by "olation" and "oxolation", and are perhaps the most complex of all complex molecules. In the third paper of this symposium Professor T. H. Whitehead of the University of Georgia discusses "The Complex Compound Theory of Colloidal Oxides." Professor Whitehead was one of the first of Professor Thomas' students to work in this field, and has continued his work on the colloidal oxides since leaving Columbia University.

Many other phases of the chemistry of complex inorganic molecules remain for discussion at later symposia. Among the most interesting of these are the problem of the structure of poly acids, upon which the recent work of Pauling (6) has thrown great light, the coördination compounds of unsaturated organic molecules, the structure of minerals, and the preparation of insoluble, colored compounds which can serve as pigments. All of these subjects are now receiving much attention. There remain other phases of the chemistry of coördination compounds which have been explored but little; for example, stability relationships of complex inorganic compounds, stabilization of valences through coördination, and the separation of the naturally occurring amino acids by the use of complex inorganic ions as precipitants. These may at some time furnish topics for symposia.

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