Chem Ed

BOOK REVIEWS

Mechanisms of Inorganic Reactions

Fred Basolo, Associate Professor of *Chemistry, and Ralph G. Pearson*, Professor of Chemistry, both of Northwestern University. John Wiley & Sons, Inc., New York, 1958. xi + 426 pp. 15.5 × 23.5 cm. $11.75.

This book is an extremely important addition to the literature of inorganic chemistry. It is well written and presents for consideration in a critical way the various facets of problems discussed in its nine chapters.

In the introductory chapter, the authors give a very brief historical introduction to the field of coordination chemistry discussing the stereochemistry of complex ions and some of the factors influencing their stabilities; included is also a short, well-organized, section on nomenclature. In Chapter II the various theories of the coordinate bond are critically evaluated. The discussion considers Pauling's Valence Bond Theory, with the Molecular Orbital Theory, the Electrostatic and the Crystal Field Theory. Very brief mathematical derivations are included which are of help in the understanding of the discussion. A special section deals in a clear fashion with the application of the Crystal Field Theory to the field of coordination chemistry.

Chapters II and III are concerned with substitution reactions in octahedral and square complexes; the effects of size and charge on SN_1 and SN_2 reactions are evaluated. The effect of the electronic structure of the central atom on reactions is discussed and exchange rates and stabilities are correlated. The application of the Crystal Field Theory to the kinetics of these reactions is discussed in detail followed by a consideration of the effects of bonding and of solvent on reaction rates. For the square coplanar complexes (Chapter IV) the authors compare the electrostatic and pi bonding theories of the trans effect on exchange and substitution reactions.

In Chapter V substitution reactions of octahedral complexes are considered with an evaluation of the SN_1, SN_2 (or modifications of these) or edge shift mechanisms proposed for these reactions. Included in this chapter is a discussion of geometrical and optical isomerization reactions. Chapter VI, Isomerization and Racemization Reactions, emphasizes cis-trans isomerization of octahedral and square coplanar complexes; for racemization reactions both the inter- and intramolecular mechanisms are critically examined for specific examples. A discussion of asymmetric transformation and stereospecific reactions of coordination compounds is also included.

In Chapter VII, Oxidation-Reduction Reactions, are considered from the point of view of electron transfer and atom transfer mechanism, and the authors attempt to evaluate the two in terms of the experimental results. The Catalytic Effect of Coordination Compounds is the topic of Chapter VIII, and the authors include homogeneous reactions in aqueous and nonaqueous systems as well as a short section on heterogeneous reactions. Because of the rapid developments in this field, some of the reaction mechanisms have since been interpreted differently in view of more recent data.

The ninth chapter consists of miscellaneous topics such as absorption and charge transfer spectra, photochemistry, ion-pair formation, and acid-base properties. The chapter concludes with a discussion of exchange reactions, and an excellent table of exchange reactions of some metal coordination compounds giving conditions and exchange rates is included.

Professors Basolo and Pearson are to be congratulated for writing this book which, in the opinion of this reviewer, will have great importance on the development of inorganic chemistry. The critical way in which they have presented the available experimental results will no doubt inspire much scientific effort in this field. This book is a *definite must* on the shelf of every inorganic chemist.

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Quantitative Analysis

R. A. Day, Jr., Professor of Chemistry, and *A. L. Underwood*, Associate Professor of Chemistry, both of Emory University, Atlanta, Georgia. Prentice-Hall, Inc., Englewood Cliffs, N. J., 1958. ix + 465 pp. Many figs. and tables. 16 × 23.5 cm. $2.

The authors "believe that so-called 'instrumental' analysis has reached the point where it should be integrated into the undergraduate program in quantitative analysis. . . .This text represents an attempt. . .to present a reasonable amount of instrumental material at a level comprehensible to undergraduates unfamiliar with physical chemistry and calculus, while at the same time not slighting volumetric and gravimetric topics." The text does not contain any laboratory procedures. There is an accompanying laboratory manual available.

Chapter 1 is an introduction of five pages. Chapter 2 (19 pages) deals with errors and the treatment of analytical data. Part I consists of the next seven chapters (170 pages). It deals with volumetric analysis. Methods, stoichiometry, and equilibrium calculations for neutralization and oxidation-reduction processes are presented quite thoroughly. The last chapter of Part I presents precipitation and complex formation titrations. Part II contains five chapters (92 pages) dealing with gravimetric analysis. Stoichiometric calculations, separation by precipitation, formation and properties of precipitates, other methods of separation, and the gravimetric analysis of simple and complex mixtures are discussed. Part III consists of four chapters (106 pages) and deals with instrumental analysis. Topics presented are: potentiometric titrations, electrolysis, polarography and amperometric titrations, colorimetry, and spectrophotometry.

A table with the formula weights of 103 substances and an international