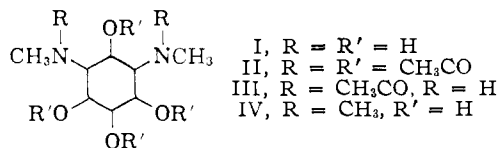


eight possible stereoisomers for such a compound. One of these isomers, the all *trans* form which would be *N,N'*-dimethylstreptamine, has been eliminated as a possibility by comparison of *N,N'*-



dimethylactinamine with *N,N'*-tetramethylstreptamine. Methylation of actinamine by Witkop's procedure⁴ gave *N,N'*-dimethylactinamine dihydrochloride (the dihydrochloride of IV), m.p. 256–258° dec., optically inactive. *Anal.* Calcd. for C₁₀H₂₂N₂O₄·2HCl (4CH₃N): C, 39.09; H, 7.82;

(4) G. F. Holland, R. C. Durant, S. L. Friess and B. Witkop, *J. Am. Chem. Soc.*, **80**, 603 (1958).

N, 9.13; CH₃N, 19.4; mol. wt., 307.2. Found: C, 38.91; H, 7.85; N, 9.01; CH₃N, 18.3; mol. wt. (electr. titr.), 318. This compound differed from *N,N'*-tetramethylstreptamine dihydrochloride⁴ in infrared spectrum and melting point and mixture melting points were depressed. The two compounds would be identical if actinamine were the all-*trans* isomer.

Acknowledgment—The author is grateful to Dr. Herman Hoeksema for helpful discussion and criticism, to Dr. E. C. Olson and associates for analyses, to Dr. R. W. Rinehart and associates for spectrophotometric data, and to Mr. Dennis J. Weber for titrations.

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BOOK REVIEWS

Progress in Reaction Kinetics. Volume 1. Edited by G. PORTER, F.R.S., Professor of Physical Chemistry, University of Sheffield. Assistant Editor, B. STEVENS, M.A., D. Phil., University of Sheffield. Pergamon Press Ltd., Headington Hill Hall, Oxford, England, 1961. viii + 276 pp. 15.5 × 23.5 cm. Price, \$12.00.

The appearance of the present volume, the first in a new series, is a sign of the growing importance of chemical kinetics in current research. The stated purpose of this series is to provide authoritative reviews of special topics in reaction kinetics and also to provide a quasi-continuous inventory of "good" rate constants. To this end the editor has drawn on a series of quite diverse experts to prepare the present group of nine articles. The experts are all quite expert and active in their fields and the articles are all clearly written if not always easily readable.

In the field of gas phase reactions, F. Kaufman has prepared a long, comprehensive article on the "Reactions of Oxygen Atoms," while J. A. Kerr and A. F. Trotman-Dickenson have done a somewhat cursory one on "Alkyl Radicals." Both of these are replete with rate constants as well as Arrhenius parameters obtained from more or less conventional studies. In a much more tentative and speculative fashion V. Voevodsky and V. N. Kondratiev present values for rate parameters for steps occurring in branching chain reactions. The reactions considered are the 2H₂+O₂ explosions as affected by small amounts of additive RH.

The new and growing field of ion-molecule reactions is discussed in considerable detail by F. W. Lampe, J. L. Franklin and F. H. Field. The data here are as yet very crude as are also the energetics. However, the unusual species produced and the very large rate constants involved are sure to presage continued interest and activity.

In the field of solution kinetics, R. M. Noyes has given a very clear and thorough exposition of the intricacies of diffusion-controlled processes and the theory of the establishment of stationary diffusion fields. C. W. Davies reviews the status of the Brönsted-Debye-Hückel treatment of salt effects on ionic reactions and summarizes some of the best data for these systems, in most cases recently obtained. His conclusion, in agreement with Scatchard, is that the theory is in good shape if corrected for ion-pairing. He points out, however, some still unresolved anomalies.

The study of the fast reactions of photochemically excited species in solution by A. Weller is interesting although very specialized in being limited to aromatic systems. Y. Pocker has attempted to clarify the somewhat troubled waters of S_Ni (i = 1,2) in his summary of some of the recent and

occasionally conflicting studies of nucleophilic substitution at saturated carbon atoms. Some of the difficulty is here skirted by restricting the discussion to non-hydroxylic solvents.

The final article by L. Peller and R. A. Alberty is an overly short discussion of the conventional physical chemistry of enzyme kinetics. This is perhaps a reflection of the complexity of these systems and the need to bring many points of view to bear on them to obtain even a simple interpretation of the kinetic data.

The present series will be of interest to research workers and students starting work in any of the fields covered. The present articles, however, are not sufficiently detailed to be of great interest to experts already at work in these fields. Particularly in the area of selecting and analyzing data critically, the present series with one or two exceptions is weak. Such a series is in direct competition with *Annual Reviews*, *Chemical Reviews* and a number of other review journals and it is hoped that the editor will in future series sharpen the distinctions between them that will make this a more valuable addition to the field.

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Advances in the Chemistry of the Coordination Compounds.

Proceedings of the Sixth International Conference on Coordination Chemistry, held at Wayne State University, Detroit, Michigan, August 27 to September 1, 1961. Edited by STANLEY KIRSCHNER, Professor of Inorganic Chemistry at Wayne State University. The Macmillan Company, 60 Fifth Avenue, New York 11, N. Y. xii + 682 pp. 16.5 × 24.5 cm. Price, \$15.00.

The conference was divided into series of eight lectures and sixty-eight papers covering a wide range of interest, not only to coordination chemists but to those on the fringes such as bio, catalytic organic and analytical.

It is, of course, impossible to list the papers, but a review of the lectures may show the scope of the conference. The lecture on bonding by C. T. Ballhausen compares the now familiar crystal field and molecular orbital approaches and in particular reviews methods for, and significance of, the determination of the extent of mixing of metal and ligand orbitals. R. E. Connick reviews some of the data on water exchange with aquo ions, then presents some of his data on rates of interconversion of a series of chloroaquoruthenium-(III) ions. In a particularly lucid and informative lecture

on synthesis of inorganic compounds, F. P. Dwyer surveys the methods and principles of synthesis of a number of inert chromium(III) and cobalt(III) compounds. The lecture on structure and stereochemistry by R. J. Gillespie is a review of the Sidgwick-Powell and Gillespie-Nyholm concept of the "best" arrangement of electron pairs about a central ion. This concept has been extended to coordination numbers 7, 8 and 9 with a number of specific examples. G. Wilkinson discusses metal-hydrogen bonds, pointing out that a number of supposed low-oxidation state metal complexes are more likely hydride complexes of higher oxidation state metals. Also discussed are a number of π -bonded hydrocarbon-metal derivatives. In a lecture on the bio-chemical significance of coordination compounds, R. J. P. Williams discusses, in particular, the role of molybdenum and cobalt in biological systems. H. Zeiss discusses the role of several metal "sandwich" compounds as intermediates in the reaction of phenyl Grignard reagent to give biphenyl. Finally, K. B. Yatsimirski reviews the methods of measurement of stability constants and discusses the significance and origin of the enthalpy and entropy terms. Of particular interest here, is the application of metal ion catalysis of reactions to the determination of stability constants of complexes of the metals, which, in the opinion of the author, is one of the more promising of the new stability constant methods.

The papers cover this same broad range of interest but each, of course, is of less general interest. The reader seeking detail may, in some cases, not be satisfied. While many of the papers are detailed and complete, others are merely abstracts, while others are either short or long reviews. Most are well referenced and, while some of the results may only be preliminary, the greatest value of the collection is that it serves as a spot-survey of the voluminous research being done in inorganic chemistry.

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Phosphorus and its Compounds. Volume II. Technology, Biological Functions and Applications. Edited by JOHN R. VAN WAZER, Senior Scientist, Monsanto Chemical Company, St. Louis, Missouri. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N.Y. 1961. xvi + 1092 pp. 16 × 23.5 cm. Price, \$35.00.

The second volume of the set describing the technology and the various applications of phosphorus appears some three years after the first volume of this useful publication.

The author dedicates this volume to "the salesman of phosphorus products..." although in my opinion the material covered in this book covers much more ground than might be indicated by such a dedication. The nineteen chapters of this volume are grouped as to general areas of: technology (six chapters, dealing with occurrence and mining, utilization and economics, wet-process phosphoric acid, fertilizer manufacture, manufacture of elemental phosphorus and major inorganic compounds, and manufacture of phosphate esters and organic phosphorus compounds), biological functions (three chapters dealing with phosphates in life processes, phosphates in biological macromolecular synthesis and energy mechanisms, and mineralized tissues) and applications (ten chapters, dealing with plant nutrition and utilization of fertilizer phosphorus, animal nutrition and phosphates in feeds, food and dentifrice applications, action of phosphates on finely divided solids, detergent building, hard-surface cleaning and water treatment, phosphorus in metallurgy, surface treatment of metals, uses of organic phosphorus compounds, and miscellaneous applications). Four appendices listing patents on phosphates in their principal applications are provided, along with an index of some 32 pages.

Unlike the first volume of this set, which was written quite evenly and with an evidently single purpose, the present volume covers such a diversity of subjects, some of which are not chemical by their nature, that a uniform mode of presentation is not achieved, even if such were possible.

As might have been expected, the bulk of material contained in this well manufactured volume discusses in considerable detail the aspects of phosphorus as a component of various articles of commerce. The large scale uses of the element and its compounds are given the lion's share of the

book and appropriate citations of economic facts support this treatment quite adequately. The manufacturing aspects of inorganic phosphates are dealt with in considerable detail and should prove useful to the many persons engaged in phosphate business. Both chemical and engineering data are provided for the reader in convenient form and in very readable language. The readers with the more scientific bent of mind will find an excellent summary of information on the action of phosphorus compounds in systems with large surfaces and small particles, *i.e.*, the fields in which enormous amounts of phosphates are used all over the world.

On the other hand, readers interested in the role of phosphorus in biochemistry may well be disappointed by the small share of this volume devoted to this general topic. This fact was undoubtedly generated by the tone of the volume indicated by the dedication. This section does provide a reader with the general picture of the metabolic role of the element, but in a field moving so rapidly in the past decade, one cannot expect such a treatment to be completely up-to-date or exhaustive within the allowed space. It may be added that the statement appearing on p. 1389 may well be argued by physical chemists ("... free energies merely represent a fancy way of reporting equilibrium constants"). Treatment of the applications of organic compounds of phosphorus also appears to be rather skimpy; probably, for the same reason.

In other words, this volume is addressed primarily to the inorganic chemist (or salesman).

Some application topics which are growing extremely rapidly and (hopefully) profitably seem to have received unduly short discussions. These are the oil additives and functional fluids, especially the latter. As indicated by the author, the latter formulations are proprietaries whose formulations are jealously guarded by the manufacturers. This is made very clear to the reader of such sections in which Trade Names only are used and the chemist is left out in the cold. In other words, a person not in the business would not even know what compounds are under discussion. While reticence in matters of business and economics is quite understandable, material of this nature does not appear to be particularly useful to a "lay" reader or even to a practicing chemist.

On the whole the volume is a fair presentation of the practical aspect of phosphorus chemistry. A pure scientist will not find very much material to digest from it, except for the few sections mentioned. A practical man will find vast amounts of useful information and all the charts and diagrams that his heart could desire.

The book is well made, even at its price, and the illustrations are generally good and to the point. One useful feature of the volume is the seven page insert of errata found in the first volume of this set. It is to be hoped that the second volume will have a much shorter list of errata (this is borne out by my examination).

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The Pfizer Handbook of Microbial Metabolites. By MAX W. MILLER, Ph.D., Pfizer Medical Research Laboratories, Chas. Pfizer and Co., Inc. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, N. Y. 1961. x + 772 pp. 16.5 × 23.5 cm. Price, \$15.00.

This volume is a comprehensive listing of the compounds produced by microorganisms from carbohydrates. The latest proposed or accepted structures are given. Some useful properties and at least one pertinent reference to each compound are given. The substances are arranged, as far as possible, in chapters of chemically related compounds.

Most chapters have an introduction summarizing the literature pertinent to the group in the chapter, "emphasizing occurrence and biosynthetic background."

Three appendices on the chemical composition of various bacteria and fungi are included. There is an Addendum (not indexed) of recent material bringing the information up to 1961. The volume is indexed by microorganism and subject.