

An ebullioscopic determination of the molecular weight of cathomycin in isopropyl alcohol-water azeotrope gave a value of 592 ± 25 . A solubility analysis of a sample showed a purity of 98.8%. Additional work on the solubility analysis is continuing. The composition of cathomycin is $C_{30}H_{36}N_2O_{11}$ or a very closely related formula.

Acknowledgment.—We are grateful to Dr. Nelson Trenner and Mr. Robert Walker for infrared

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BOOK REVIEWS

Chemisorption. By B. M. W. TRAPNELL, M.A., Ph.D., Lecturer in Chemistry, Liverpool University. Academic Press, Inc., Publishers, 125 East 23rd Street, New York 10, N. Y. 1955. vii + 259 pp. 14.5 × 22 cm. Price, \$6.80.

Chemists interested in adsorption or catalysis, and even physical chemists generally, owe a debt of gratitude to Dr. Trapnell for writing this unique and timely volume. For such a relatively short monograph it was doubtless wise to adopt a selective rather than comprehensive treatment. In so doing he omits very large areas of the subject and bypasses many of its more controversial aspects. But in exchange he obtains space for an extensive treatment of selected areas, particularly his own specialty of adsorption of gases by metal filaments and evaporated films. Here he feels safe from complications due to possible adsorption or to contamination.

He has, as he says, "concentrated on the aspects of the subject which seem to me best understood." There is only occasional mention of gaseous adsorption by "powders," and none of adsorption from solutions.

The chapter headings are revealing. After a brief Introduction (a kind of sampler of the subject), they are: Experimental Methods (33 pp.); Velocities of Adsorption and Desorption—I. Activation Energies (37 pp.); Velocities . . . II. Velocity Constants and the Dependence of Velocity Upon Coverage (23 pp.); Adsorption Isotherms (31 pp.); The Heat of Adsorption (30 pp.); Mechanisms of Chemisorption (31 pp.); The Mobility of Adsorbed Layers (17 pp.); Catalytic Specificity (18 pp.); Mechanisms of Catalytic Reactions (25 pp.).

The presentation is admirably lucid in general, even in areas of theory which are highly speculative. An occasional derivation suffers from lack of precise definition of terms or symbols. Applications of theory to experiment are somewhat less satisfying, because of the small number of cases usually discussed, and because of a tendency to accept as certainly known some conclusions which others may consider highly debatable.

In the chapter on catalytic specificity it is stated that high catalytic activity requires, among other things, a weak but rapid chemisorption of the reactants. (Desorption of products is later said to be of secondary interest.) It seems that the spacing of sites must be rather unfavorable for chemisorption but of course not too much so. The relation of catalytic activity to d character of the transition metals is incorrectly stated on p. 227, but oversights of this kind and typographical errors are practically absent.

The final chapter deals only with isomerization and exchange reactions of hydrogen, with the interaction of ethylene and hydrogen isotopes, and with hydrocarbon cracking. In the first case the relations to measured chemisorptions are clear, but they become rapidly less so in the other two cases.

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The Nitrogen Metabolism of Micro-organisms. By B. A. FRY, B.A., Ph.D., Lecturer in Microbiology in the University of Sheffield. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1955. ix + 166 pp. 10.5 × 17 cm. Price, \$2.00.

In this excellent monograph, the comprehensive subject coverage is organized according to the various steps of the nitrogen cycle, with separate chapters on nucleic acids, amino acid absorption and on the action of chemotherapeutic agents. This organization has the sole disadvantage of splitting metabolism of amino acids into two distant chapters. Outstanding features of the book are: (a) the frequent inclusion of excellent background discussions of biochemical fundamentals; (b) clarity, accuracy and selectivity in documentation of major points and (c) lucid explanations of the various important experimental approaches as they come to bear on the subject matter, e.g., use of biochemical mutants. (However, not all approaches receive full treatment, e.g., enzyme induction and growth factor replacement technique.)

The lucid style is supported by excellent typography. Illustrations, plates and tables are clear and well explained. Chemical equations are rather compressed.

It is stated in the preface that, although examples are drawn from experiments with bacteria, fungi, algae and protozoa, the main emphasis is naturally on the first two of these groups. Actually, there are not a half-dozen citations given to experiments with algae and protozoa. This seems unduly limited. Nevertheless this book must be considered as outstanding among present references for comprehensive coverage and selective documentation. Certainly the author has achieved his aim "that advanced students . . . and research workers . . . will find it a convenient and concise introduction to one important section of microbiological biochemistry."

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High Polymers. Volume III. Mechanism of Polymer Reactions. By G. M. BURNETT, Department of Chemistry, The University, Birmingham, England. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1954. xv + 493 pp. 16 × 23.5 cm. Price, \$11.00.

This book is a new and completely revised version of Mark and Raff's "High Polymeric Reactions," which was the original Volume III of this series. The differences between the two books provide a dramatic illustration of the amount of progress which was achieved in polymer chemistry during the intervening decade. The original edition reviewed in some detail a major part of the material then available. Sheer bulk would make such an approach impracticable today. The new edition is organized entirely on the basis of general principles and theoretical analyses, with selected specific cases chosen as illustrations.

The first chapter is a very brief summary of chemical kinetics. The second describes experimental methods used in the study of polymerization reactions. The next five chapters cover in great detail the mechanism and kinetics of free radical addition polymerization. Chapter 8 presents an excellent summary of copolymerization. The ninth chapter treats heterogeneous liquid-phase polymerization—suspension and emulsion systems. This is followed by a very long and detailed chapter on degradation reactions of high polymers. The last two chapters are on ionic polymerization and condensation polymerization, respectively.

The treatment of condensation polymerization was somewhat disappointing to this reviewer. The theoretical, particularly the mathematical, aspects of the subject were very adequately covered; but these theoretical principles could have been accompanied, to advantage, by a considerably broader selection of qualitative information on the chemistry of polycondensation reactions. However, this is less a criticism of the author than of the literature available for him to survey. The experimental literature on polycondensation reactions consists of a very few studies designed to test or illustrate theoretical principles, plus many purely qualitative papers and patents which completely ignore theory. The boundary line chosen by the author is a logical one, corresponding to an existing chasm in our knowledge of these reactions; he has left to some future reporter the more ambitious task of bridging this chasm and integrating the mass of qualitative information into the theoretical framework.

The other topics are all covered in a thoroughly satisfactory manner. The book will prove invaluable to all persons who are interested in the mechanisms of polymer reactions.

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Chemical Engineering Science. Genie Chimique. The Proceedings of the Conference on Oxidation Processes. Editorial Board: J. CATHALA, Toulouse, P. V. DANCKWERTS, Cambridge, BARNETT F. DODGE, New Haven, Conn., M. B. DONALD, London, F. GIORDANI, Naples, A. GUYER, Zurich, W. L. DE KEYSER, Brussels, D. W. VAN KREVELEN, Geleen, Netherlands, R. W. SOUTHWORTH, New Haven, Conn., S. G. TERJESSEN, Trondheim. Pergamon Press, Ltd., 4-5 Fitzroy Square, London, W. 1., England. 1954. 135 pp. 19.5 × 25.5 cm. Price, £1.15.0.

This symposium is notable for the wide scope of oxidation processes covered, ranging from the mechanism of liquid phase oxidation to the use of oxygen in the steel industry. Emphasis is generally on processing and less on theoretical considerations although both points of view are represented. Chemists and chemical engineers interested in oxidation processes will find this collection of papers a valuable source of information.

Industrial practice is discussed for the established commercial processes of the preparation of fatty acids by air oxidation of paraffins, adipic acid by nitric acid oxidation of mixtures of cyclohexanone and cyclohexanol, and the production of acetylene by partial oxidation of methane.

Papers are included on the use of oxygen in steel making and in gasification processes. The technical aspects of tonnage oxygen production are also discussed.

Liquid phase hydrocarbon oxidation is well represented by papers on the oxidation of cumene to cumene hydroperoxide, and of *p*-*t*-butyltoluene to *p*-*t*-butylbenzoic acid and on the mechanism of liquid phase oxidation.

In a discussion of the use of vanadium oxide catalysts the commercially interesting oxidations of sulfur dioxide, naphthalene and benzene are viewed from a kinetic standpoint. Conclusions are related to industrial practice.

The direct oxidation of benzene to phenol is described in which the addition of cyclohexane is shown to have a marked effect on the yield of phenol.

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The Structural Chemistry of Proteins. By H. D. SPRINGALL, M.A., D.Phil., F.R.I.C., Professor of Chemistry, University College of North Staffordshire. Academic Press Inc., Publishers, 125 East 23rd Street, New York 10, N. Y. 1954. x + 376 pp. 15 × 22 cm. Price, \$6.80.

During recent years great progress has been made in the field of the structural chemistry of proteins through the application of a number of techniques. These techniques are so different in nature that it is hard to find someone who is able to discuss all of them in a thoroughly competent way. Professor Springall, an organic chemist who has been interested in physical chemistry and modern structural chemistry as well as organic chemistry, and who has himself carried out investigations in the field of the determination of molecular structures by diffraction methods, is admirably suited to the task of writing a succinct, reasonably detailed, and up-to-date account of proteins, including their chemical composition, chemical properties, physico-chemical properties, and molecular structure. His book can be recommended both as a textbook and as a reference book.

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LINUS PAULING

The Nucleic Acids. Chemistry and Biology. Volume II. Edited by ERWIN CHARGAFF, Department of Biochemistry, Columbia University, New York, N. Y., and J. N. DAVIDSON, Department of Biochemistry, University of Glasgow, Glasgow, Scotland. Academic Press Inc., Publishers, 125 East 23rd Street, New York 10, N. Y. 1955. xi + 576 pp. 16.5 × 23.5 cm. Price, \$14.50.

This excellent book and its companion volume will be indispensable to all workers in the many fields that contact each other on the common ground represented by the nucleic acids. Here investigators in biochemical genetics, cytology, virology, radiation, differentiation, growth metabolism and cancer research will find a masterful account of the present status of the role of the nucleic acids. The two volumes are subtitled Chemistry and Biology and in a general way volume I was on the chemistry of the nucleic acids, while volume II has more to do with their biology. But there is so much of both chemistry and biology in each volume that it would have been misleading to label them separately and both volumes are essential. Surely no individual could have written these books, and the editors were wise in selecting separate authors for their 28 chapters. In the present volume the chapters on biosynthesis of nucleic acids and their components by Glock, Reichard, Schlenk, and Brown and Roll are moving accounts of the rapid progress in this field, and the chapters on the biological role of deoxyribose nucleic acid by Hotchkiss, of pentose nucleic acid by Brachet, and the metabolism of the nucleic acids by Smellie are even more exciting as they lead into what is surely the beginning of the stage of integration that makes the increasing complexity emerge into simplifying generalizations. These later stages can be reached no sooner than methods are developed and perfected, and the chapters by Leslie, Swift, Dounce, Vendrely, Thorell and Hogeboom and Schneider provide the reader with valuable discussions of methods along with their accounts of progress in the field.

This volume is not just a compendium of references, although as such it is a tremendous collection of over 200 references in most chapters. The references are skilfully assembled into a highly useful picture. The authors were each given the opportunity to add an addendum to their chapter in which the latest reports were included. Thus it is seen that no one had guessed that the nucleosides would be bypassed as intermediates in nucleic acid synthesis with the ribose and phosphate brought in together by means of 5'-phosphoribosylpyrophosphate. While there was time to note the occurrence of di- and triphosphates of all the mononucleotides derived from pentose nucleic acid, there has not been time to assess the significance of these findings or to evaluate reports that the diphosphates may be the immediate precursors of the nucleic acids. The growing realization that nuclear pentose nucleic acid is metabolically more active than the cytoplasmic counterpart was brought out in several chapters but no one was prepared to come out flatly with the pronouncement that at least a part of the cyto-