

tables can be lessened by using ranges instead of variances. This may be true for simple ANOVA tables. It is not so true for the more complex experiments as can be seen in the author's examples of 3-factor ANOVA tables (pp. 70-84).

The remainder of the book is an explanation of how to use ranges, in place of variances, in all kinds of statistical tests of significance. Chapters are devoted to the comparison of two averages, simple and complex factorial experiments and linear regression.

The final chapters are on sampling and the control of routine analyses. The statistical aspects of attribute and variable sampling are discussed; but little help is given to solve the practical problems of sampling for chemical analysis. The use of control charts and the Studentized range to help control routine analyses is explained.

A great many numerical examples are worked out in detail throughout the entire book to illustrate the statistical techniques.

The following tables are given in the appendix

- I Factors for Confidence Limits of an Average (using-ranges)
- II Factors for Confidence Limits for Individuals (using ranges)
- III Values for $L = (\bar{x}_1 - \bar{x}_2)/R$ which will be exceeded with a probability P
- IV Values of $M = (\bar{x}_1 - \bar{x}_2)/(R_1 + R_2)$ which will be exceeded with a probability P
- V and VI Factors to Estimate Standard Deviation from Range
- VII Critical Values of the Studentized Range
- VIII Critical Values of F
- IX Factors for Computing Control Chart Limits

The author hopes (p. v) that this manual will serve as a statistical primer; but it is doubtful whether the chemist, with no prior knowledge of statistical methodology, will succeed in learning to use it correctly, by himself. The chemist, already well trained in conventional methods of computing ANOVA, may not want to take time to learn how to use ranges in place of variations. However, the book may be useful to the chemist who has some background in statistics and is willing to take time to learn how to use the range methods explained in the book.

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The Neurochemistry of Nucleotides and Amino Acids. A Symposium of the Section on Neurochemistry, American Academy of Neurology. Edited by ROSCOE O. BRADY, M.D., and DONALD B. TOWER, M.D., National Institute of Neurological Diseases and Blindness, Bethesda, Maryland. John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 15.5 × 23.5 cm. Price, \$10.00.

This title is either forward looking or misleading. The first symposium reviews, to 1958, recent elucidations of metabolic functions of nucleotides of uracil, guanine and cytosine. Classes of compounds emphasized are present in, but not necessarily peculiar to, brain. D. R. Sanadi, in particular, emphasizes the importance of high purity preparations in detection of the roles of catalytic quantities of nucleotides of the various bases. The long known high proportion of nucleotides of guanine in the brain, and the fact that nucleosides of the pyrimidines can play a role in maintaining electrical activity in brain, remain the most unique observations. The character of the ribonucleic acid-like material in the Nissl substance receives attention.

The second symposium better justifies the title. There is considerable evidence for some unique roles for certain amino acids in neural tissues. The pertinent metabolism of phenylalanine and tyrosine, of tryptophan and serotonin, and of glutamic acid and β -aminobutyric acid are thoroughly reviewed.

The volume suffers from the pernicious habit of liberal "coding" with abbreviations which divert the reader from the context. Nomenclature errors are even found in titles (and are objected to in an authors' footnote on page 28).

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Quantum Chemistry. Methods and Applications. By R. DAUDEL, R. LEFEBVRE and C. MOSER, Centre de Mécanique Ondulatoire Appliquée du Centre National de la Recherche Scientifique, Paris. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y., 1959. xiii + 572 pp. 16 × 23.5 cm. Price, \$14.50.

It is a pleasure to see at last a book with the title "Quantum Chemistry" that deals primarily with the application of quantum theory to chemical problems, rather than to spectroscopy and atomic structure. A book of this kind is urgently needed since the subject has developed rapidly in recent years. This book by three distinguished experts in the field is clearly an attempt to meet this need.

The book falls into two parts. The first thirteen chapters deal with the simple Hückel treatment and its application to specific problems of chemistry; there are chapters on interatomic distances, bond angles, dipole moments; on bond dissociation, resonance and ionization energies; on chemical reactivity, reaction rates equilibria, molecular spectra and biological applications. The second part deals with modern orbital theory, covering the present position in a very satisfactory manner. Most of the more important recent developments are discussed, including the Pariser-Parr treatment and Moffitt's atoms-in-molecules method. The presentation is clear and the book well produced.

The main failing of the book—and this unfortunately a serious one—is a lack of references to recent work on the chemical applications of quantum theory. Out of about 300 references in the first part of the book only some 25 are to papers published since 1952—and there are serious omissions before that. The situation is made worse by the randomness of the cover; partisanship would at least have ensured an up-to-date account of one point of view. One particularly unfortunate consequence is the omission of any reference to crystal field theory or the MO treatment of transition metal complexes; even ferrocene escapes mention. The whole of this field has developed largely in the last eight years.

Criticism could also be leveled at the general account of quantum theory in chapters 14-16 (125 pages of text). This would not be an adequate preparation for a reader unversed in quantum theory who wanted to read the chapters dealing with the mathematics of MO theory; since there are numerous good text books on quantum theory available, the space could have been better used either on a more detailed account of the techniques of calculation or on such recent topics as transition metal complexes, magnetic resonance spectroscopy and optical activity.

Nevertheless this is a useful contribution to the chemical literature, containing much material that has never before appeared in book form. It can be recommended to all chemists interested in the field.

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Catalysis. Volume VII. Oxidation, Hydration, Dehydration and Cracking Catalysts. Edited by PAUL H. EMMETT, W. R. Grace Professor of Chemistry, The Johns Hopkins University, Baltimore, Maryland. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1960. vi + 378 pp. 16 × 23.5 cm. Price, \$13.50.

This volume completes a notable series of books entitled "Catalysis." The present book contains six chapters. The first chapter written by Ryland, Tamele and Wilson deals with cracking catalysts and presents a rather detailed description of their preparation, nature, and probable activity mechanisms. In chapter two Winfield discusses the mechanisms of catalytic dehydration and hydration with the aid of numerous reactions, catalysts, and tables. The last half of the book, comprising four chapters, has been written by Dixon and Longfield. Chapter three, covering nearly a hundred pages, is devoted to the vapor phase oxidation of hydrocarbons at solid surfaces. The behavior of numerous catalysts for the oxidation of such substances as benzene, naphthalene, toluene, ethylene, propylene, polynuclear and substituted aromatic hydrocarbons, naphthenes, terpenes and heterocyclic compounds is presented, with the aid of several tables. The effect of hydrocarbon structure is emphasized. In chapter four a number of

oxidation catalysts and pertinent reactions are discussed for the oxidation of ammonia to oxides of nitrogen, of ammonia and methane to hydrocyanic acid, of carbon monoxide, and of sulfur dioxide. In chapter five, comprising about a dozen pages, mechanisms of catalytic oxidation are presented in terms of solid state theory. Here the catalytic properties of metallic oxides are related to their structures as semiconductors. Miscellaneous catalytic oxidations are tabulated in chapter six, which covers five pages.

The present book maintains the high standards set early in this series. The discussion of the various aspects of hydrocarbon oxidation is especially timely in view of the great interest currently in dealing with exhaust vapors from gasoline engines. It is to be regretted that this final volume could not have presented a more complete discussion of the implications of modern solid state theory for catalysis.

Professor Emmett and the cooperating authors are to be thanked for the contribution which they have made to the field of heterogeneous catalysis in summarizing, clarifying and interpreting past work, and in stimulating further research.

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The Alkaloids. Chemistry and Physiology. Volume VII. Supplement to Volumes II, III, IV, and V. Edited by R. H. F. MANSKE, Dominion Rubber Research Laboratory, Guelph, Ontario. Academic Press Inc., 111 Fifth Avenue, New York 3, N.Y. 1960. xiii + 559 pp. 16 X 23.5 cm. Price, \$17.00.

Volume VII of "The Alkaloids" attempts to bring up to date the chemistry of the alkaloids covered in volumes III, IV, V and part of II, and is really a continuation of volume VI since the prefaces are the same. The topics covered are the Indole, Erythrina, Quinoline (except Cinchona), Quinazoline, Lupin, Steroid, Ipecac, Isoquinoline, Phthalideisoquinoline, Bisbenzylisoquinoline, Aconite, Delphinium, Garrya, Lycopodium, unclassified and minor unknown alkaloids. Except for a few addenda (compliments to those authors) the chapters summarize progress to the end of 1957, the preface was written June, 1959, but the book did not appear until the middle of 1960. Thus the reader is left unaware of the substantial advances made in the last two years within the Indole, Steroid and Lycopodium groups. In fact the fast growing subject matter of the former group would have benefited considerably from a complete rewrite rather than the preparation of a supplement.

In order to read this volume properly, the reader must have before him the previous volumes in the series, since the numbering of the references and formulas are often continuous with the corresponding chapter in the earlier work. It is free of major errors and the formulas are well set out, but there are occasional irritations and omissions. Where a full paper can be cited, this is surely better than a thesis reference, for example p. 520, ref. 18, Thesis, 1956, covers work in the *J. Chem. Soc.*, 1044 (1955). In the chapter on Aconite and Delphinium Alkaloids no reference is made to the authoritative review by Wiesner and Valenta, "Progress in the Chemistry of Organic Natural Products," Vol. 16, 1958; also line 14, p. 73, in the Indole chapter is incorrect. Finally the reviewer has always felt that the subtitle of this work has been misleading since, with the exception of some specialized chapters in Volume V, the pharmacological aspects have not been adequately treated. Despite this last comment and the delays in publication, Manske is to be congratulated for bringing out these supplemental volumes, which along with the

previous five and Henry's book are a must for the library of the chemist interested in natural products.

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BOOKS RECEIVED

November 10, 1960–December 10, 1960

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