these new soluble Mg-H compounds have been shown to add to both alkenes and alkynes thereby providing an alternate to those reactions involving hydroboration. We are actively engaged in a study to arrive at optimum conditions for effecting such addition reactions.

Acknowledgment. We are grateful to the Office of Naval Research for financial support of this work.

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E. C. Ashby,* A. B. Goel
School of Chemistry, Georgia Institute of Technology
Atlanta, Georgia 30332
Received Aug 27, 1976

*Book Reviews**

Catalysis in Organic Synthesis, 1976. Edited by P. N. RYLANDER and H. GREENFIELD. Academic Press, New York, N.Y. 1976. x + 363 pp. $16.50.

This is a volume of 17 papers given at the Fifth Conference on Catalysis in Organic Syntheses", held in Boston in 1975. The papers are reproduced directly from typescript, and are largely reports of original research, including some experimental detail. They are sorted into the groups "Engineering Aspects and Surface Catalysis", "Special Topics", "Polymer-attached Homogeneous Catalysis", "Catalytic Processes", and "Hydrogenation".

The first such conference was held in 1960, and previous proceedings have been published in *Annals of the New York Academy of Sciences*. The original sponsorship by the Academy has been superseded by the newly formed "Organic Reactions Catalysis Society". The topics cover a broad field, with papers ranging from Auger spectroscopy through enzymatic epoxidation to asymmetric hydrogenation with chiral catalysts. There is a slim subject index.

Spectroscopic Data. Volume 2. Homonuclear Diatomic Molecules. Edited by S. N. SUCHARD and J. E. MELZER. IFI/Plenum Press, New York, N.Y. 1976. vii + 585 pp. $57.50.

The first of this two-volume work was devoted to heteronuclear diatomic molecules and appeared in 1975. This volume is in effect one enormous table, in which the molecules are listed in alphabetic order. The overly broad title is misleading, for the spectroscopic data given are primarily electronic. The tables give in briefest form "Methods of Production and Experimental Technique", followed by description of the band systems and references to sources, spectroscopic constants, etc. The Introduction describes the basis of the search to compile the information presented, but unfortunately does not state the date up to which the compilation was made. The volume is nicely produced and the data are presented in an uncrowded manner.

The Heavy Transition Elements. By S. A. COTTON (University of East Anglia) and F. A. HART (University of London). Wiley/Halsted, New York, N.Y. 1975. xii + 272 pp. $23.50.

This text describes the inorganic chemistry of the second- and third-row transition elements. The level and quantity of material presented is well suited for a one-semester course for advanced undergraduate or beginning graduate students. The first eight chapters each start with a table showing some of the compounds formed by a 3d transition element and then describe the chemistry of the two heavy transition elements of the same group. The main topics covered are the metals, aqueous chemistry, oxides, halides, and coordination complexes (including organometallics). The ninth chapter deals exclusively with complexes of π-bonding ligands, and the concluding two chapters devote 73 pages to the lanthanides and actinides.

This book differs from some of the other popular inorganic texts in that the authors have concentrated on the descriptive chemistry and periodic trends of the elements with minimal discussion of the nuances of bonding, spectroscopic and magnetic properties, and applications. Literature references are given for only a few of the many reactions and compounds described. Lucid prose, ample use of structural drawings, and a good format keep the text readable despite a high density of information. As intended, the authors have written an accurate and detailed description of the heavy transition elements which is of manageable length but cannot be readily extended to provide an introduction to research.

Alan Brenner, *Wayne State University*

Annual Review of Biophysics and Bioengineering. Volumes 3 and 4. Edited by L. J. MULLINS, W. A. HAGINS, L. STRYER, and C. NEWTON. Annual Reviews, Inc., Palo Alto, Calif. Volume 3: 1974. 403 pp. Volume 4: 1975. $15.00. 604 pp.

The articles found in Volumes 3 and 4 of "Annual Review of Biophysics and Bioengineering" cover a tremendously broad range of scientific interests. Volume 3 includes articles on topics ranging from enzyme kinetics, DNA conformations, and x-ray data to articles on the analysis of convection and diffusion in capillary beds as well as scintillation scanning of the brain. Volume 4 includes topics ranging from tRNA structure, fluorescent probes and concentration correlation spectroscopy to computer methods in electrocardiography, artificial kidneys, and computer monitoring in patient care.

Clearly such a broad range of subject matter cannot be critically commented on by one reviewer. Therefore, articles selected for specific comment generally reflect the personal interests of the reviewer. However, without requiring great expertise in all the fields discussed, it should be mentioned that both volumes are extremely well written and well organized.

Articles selected for particular comment from Volume 3 include: Kinetics of Allosteric Enzymes; Applications of Calorimetry in Biochemistry and Biology; Properties of Water in Biological Systems; Conformational Changes in DNA Molecules. These four articles are written in such a way that very little specialized expertise is required to fully benefit from the material. In particular, the article by Cooke and Kuntz on the properties of water in biological systems represents a clear and important presentation of a significant yet poorly understood area.

In Volume 4 three articles warrant specific comment. These include Thermal Properties of Biomaterials; Quaternary Structure by Small Angle Neutron Scattering; and Concentration Correlation Spectroscopy. The latter article by Elson and Webb represents a particularly well-written and fascinating presentation of a new and potentially powerful biophysical probe.

Once again it should be mentioned that many of the articles in Volumes 3 and 4 that have not been specifically mentioned provide interesting and exciting reading. However, due to the breadth of the material covered, it is not possible for one reviewer to critically appraise all of the articles. It is therefore suggested that the contents of the two volumes be carefully examined by all those interested in topics related to biophysics and bioengineering.

Kenneth J. Breslauer, *Rutgers University*

* Unsigned book reviews are by the Book Review Editor.

Terpenoids and Steroids. Volume 5. Senior Reporter: K. H. OVERTON. The Chemical Society, London. 1975. x + 390 pp. £21.00.

This volume of the Specialist Periodical Reports covers literature published between September 1973 and August 1974. The coverage is exceedingly broad and includes journals that are not readily available to the average chemist. The chapter on steroid synthesis, which is unusually interesting, covers a two-year period. Steroids are also favored with a list of review articles published in the period 1969–1974. A large amount of information is presented in this book succinctly and accurately. And, of course, much of the material has general application.

Presumably the "tight-rope economics" of production are responsible for the lack of a subject index (there is an author index). The detailed table of contents makes up for this lack fairly well in the case of steroids. However, terpenoids are subdivided according to the classical method (sesquiterpenes, diterpenes, etc.), and here I did have some difficulty in locating a particular reaction I was interested in.

Louis F. Fieser, *Belmont, Massachusetts*

Chemical and Biochemical Reactivity. Edited by ERNST D. BERGMANN (The Hebrew University) and BERNARD PULLMAN (University of Paris). D. Reidel Publishing Co., Dordrecht, Holland. 1974. viii + 578 pp. $39.00.

This book is a record of 43 papers presented at an International Symposium on Quantum Chemistry and Biochemistry held in Jerusalem in April 1973. It represents one of the first attempts to provide in one volume a comprehensive survey of the various current approaches of quantum chemistry to molecular and biomolecular reactivity.

The viewpoints and quantum-mechanical techniques represented in the various papers are as diverse as the chemical and biochemical systems for which they are intended, ranging from large-scale CI calculations of potential surfaces for reactions involving relatively small molecules to the use of simple molecular-orbital concepts to elucidate the reactivity of more complex molecules. Although many of the papers are highly formal or specialized, an attempt has been made in most contributions to keep a close connection of theory to experiment.

No effort has apparently been made to organize or connect the various papers in a coherent fashion, although there is a brief summary of the Symposium by one of the editors at the end of the book. This volume will be most useful to the reader who already has some familiarity with basic quantum chemistry. For the reader who is interested in present directions of quantum-mechanical research on chemical and biochemical reactivity, this book provides a valuable source.

K. H. Johnson, *Massachusetts Institute of Technology*

Subunit in Biological Systems. Part C. By SERGE N. TIMASHEFF and GERALD D. FASMAN (Brandeis University). Marcel Dekker, Inc., New York, N.Y. 1975. 360 pp. $39.50.

An understanding of the role of subunit interactions in biological systems becomes essential as more details of highly complex biological functions are disclosed. The series of volumes by Timasheff and Fasman, "Subunits in Biological Systems", is devoted to reviews on the structural and conformational aspects of macromolecules and their relationships to function. The term "subunit" is used in the broadest sense, including both covalently and noncovalently linked structural entities.

This book is Part C of the series and deals with four main topics, namely intermolecular interactions and allosteric effects, immunoglobulin subunits, the enzyme, glutamate dehydrogenase, and the structure of polyribosomes. The chapter "Molecular Interactions and Allosteric Effects" by G. Nemethy is a general discussion of the thermodynamic and the molecular aspects of the structure of macromolecules. It reviews noncovalent interactions which determine protein conformation, relationships with intermolecular interactions, thermodynamic and statistical ligand interactions and related conformational changes, models for allosteric proteins, ligand binding, and conformational changes and molecular interactions and their relationship to each other. Kinetics of allosteric interactions or catalysis and reaction mechanisms are not included, and the reader is referred to other review articles. The present chapter stresses structural aspects of proteins and their changes. The discussion in this chapter of the relationships between intermolecular interactions and biological activity is a comprehensive and excellent one.

The chapter by R. E. Cathou and K. J. Dorrington and "The Conformation, Interaction and Biological Roles of Immunoglobulin Subunits" discusses examples of subunit interactions of a specific group of proteins. It is a critical evaluation of research concerning the ways that these subunits interact and contribute to the conformation and biological activities of the intact molecule.

The chapter entitled "Glutamate Dehydrogenase" by H. Sund, K. Markin, and R. Koberstein is the only one which deals with an individual protein. Animal glutamate dehydrogenase is a mitochondrial enzyme, composed of six subunits, each of which is both active and stable (unimer). These subunits are capable of undergoing reversible association, suggesting the conformation of these enzymes in the associated state is stabilized by further levels of organization. The functional relations of the subunit structure are discussed.

The last chapter of the book by L. I. Malkin is on "Structure of Polyribosomes". Of course, much is known about polysomal functions in protein synthesis, but less is known about the structure of polyribosomes. This chapter reviews available evidence about the structural relationship between mRNA, the growing nascent polypeptide chain, and ribosomes. It complements the chapter by A. S. Spirin on "The Principles of Ribosome Structure", published in the previous volume of the series.

In general, this volume is a readable and comprehensive guide to subunit assembly and interactions. It will be useful for biochemists and biophysicists working in these particular areas, and also for investigators and students studying macromolecular interactions.

Shigeru Sassa, *The Rockefeller University*

The Foundations of Newton's Alchemy or "The Hunting of the Greene Lyon". By BETTY JO TEETER DOBBS (Northwestern University). Cambridge University Press, New York, N.Y. 1975. xv + 300pp. $22.50.

This impressively researched, scholarly, historical study will, without doubt, be of great interest to serious historians of alchemy since it is the first general interpretation of the extensive alchemical work of Sir Isaac Newton (1642–1727). It is, however, of minimal appeal to chemists who read history of chemistry as an avocation.

In 1936 the descendants of Newton's niece sold Newton's alchemical manuscripts which had been marked as "not fit to be printed" after Newton's death. John Maynard Keynes, the famous economist, acquired many of these manuscripts and left them to King's College, Cambridge. Dr. Dobbs, basing her study primarily on the Keynes collection as well as a few other manuscripts, has arrived at many interesting conclusions, among the most important being that Newton, who was devoted to alchemy, attempted an integration of alchemy and mechanism which wanted a maturity that the seventeenth century could not provide.

David H. Kenny, *Michigan Technological University*

Principles of Microbe and Cell Cultivation. By S. JOHN PIRT (Queen Elizabeth College, University of London). Halsted Press/John Wiley & Sons, New York, N.Y. 1975. x + 274 pp. $34.00.

Although microbiology has a long and extensive history of taxonomic research, precise physiological and biochemical data are lacking for the majority of organisms. Even industrial processes involving microorganisms depend largely on the "cook until done" approach. Product formation is often difficult to control and as a result, industrial exploitation of microbial products is neglected. This monograph is designed to provide a basis for the development of a true science of microbiology. Many problems are analyzed mathematically, and a knowledge of calculus is assumed. This book is divided into 25 chapters and includes discussions of the following topics: the nature of a microbial culture and historical development, parameters of growth and analysis of growth data; estimation of biomass; batch and plug-flow culture; chemostat culture; death of cells in growing cultures; aeration and nutrition, effects of temperature, pH, and water activity; product formation, inhibition and activation, stationary phase behavior, growth lag, mixed cultures, effects of growth conditions; and mathematical models of biomass autosynthesis. This monograph will be of particular interest to advanced students of microbiology and microbiological engineers.

M. C. W. Smith, *University of Michigan*