Additions and Corrections

Hydrophobic, Non-Hydrogen-Bonding Bases and Base Pairs in DNA [*J. Am. Chem. Soc.* **1995**, *117*, 1863−1872]. BARBARA A. SCHWEITZER AND ERIC T. KOOL*

Recent X-ray crystallographic and ^{1}H-NOE data indicate that the stereochemistry of **1** and **2** was incorrectly assigned. Both **1** and **2** as synthesized are in fact α- rather than β-anomers. Compound **3** is correct as shown. The original assignments were made based on correlation with a published proton NMR spectrum of a related phenyl nucleoside, and also by correlation of H-1′ coupling constants to known α- and β-nucleosides. It is now evident that these coupling patterns are generally reversed for aromatic *C*-deoxynucleosides as compared to *N*-nucleosides. A complete description of this unexpected finding will be published separately. Recent studies of properties of the authentic β-anomers in DNA show little change in the results. The data in the manuscript are correct, and the primary conclusions of the paper, involving hydrophobic and hydrophilic interactions in DNA, still stand.

JA955034Z

Model Studies of the (6−4) Photoproduct DNA Photolyase: Synthesis and Photosensitized Splitting of a Thymine−5,6-Oxetane [*J. Am. Chem. Soc.* **1995**, *117*, 11375−11376]. GAUTAM PRAKASH AND DANIEL E. FALVEY*

Page 11376: The unit of the "Reactant" in Table 1 should be μmol, and not nmol.

JA955035R

Book Reviews *

Advances in Photochemistry. Volume 20. Edited by Douglas C. Neckers (Bowling Green State University), David H. Volman (University of California-Davis), and Günther von Bünau (Universität Siegen, FRG). Wiley: New York. 1995. ix + 301 pp. $95.00. ISBN 0-471-11469-3.

Volume 20 continues to explore the frontiers of photochemistry through five chapters written by experts in the field. Each chapter is a review of the topic intermingled with discussion and evaluation. The topics are narrow in scope. The book is useful to those interested in the application of photochemistry in interdisciplinary areas and to those interested in any of the particular chapter subjects.

Chapter 1. Present Status of the Photoisomerization About Ethylenic Bonds. By Tatsuo Arai and Katsumi Tokumaru (57 pages, 156 references). Photoisomerization occurs by two pathways. One occurs on the ground-state surface after deactivation of the twisted, excited-state intermediate (diabatic), whereas the other occurs on the excited state (adiabatic). Which pathway prevails for a particular system depends on several factors, including the aromatic substituent(s) and excited-state multiplicity.

Chapter 2. Cooling of a Dye Solution by Anti-Stokes Fluorescence. By Christoph Zander and Karl Heinz Drexhage (30 pages, 21 references). Laser irradiation of a dye solution can lead to cooling via anti-Stokes fluorescence. Several experimental prerequisites include unit quantum yield for fluorescence, an ultra pure dye, and use of a deuterated solvent. With Rhodamine 6G, a cooling power of 1 μW at 575 nm was observed using thermal lensing to detect the cooling.

Chapter 3. Atmospheric Photochemistry of Alternative Halocarbons. By Joseph S. Francisco and M. Matti Maricq (85 pages, 213 references). The atmospheric degradation of HFCs and HCFCs occurs via H-abstraction by hydroxyl radical followed by reaction with O_2. Several key secondary products, CF_3O, FCO, and FC(O)O, may be involved in ozone depletion cycles. The treatment is comprehensive, and it includes 11 tables, mostly of rates, and 17 figures, mostly of UV spectra.

Chapter 4. Photochemistry and Photoelectrochemistry of Quantized Matter. Properties of Semiconductor Nanoparticles in Solution and Thin-Film Electrodes. By Horst Weller and Alexander Eychmüller (52 pages, 91 references). Recent synthetic advances have made possible the generation of uniform semiconductor (e.g., CdS) particles which lie in size somewhere between isolated molecules and bulk solid. Fluorescence and other physical properties are interpreted within a theoretical framework involving both molecular and bulk parameters. The synthesis and properties of "composite" particles (e.g., CdS/ZnS or Ag_2S) and three-layered particles (e.g., CdS/HgS/CdS) is presented. The spectroelectrochemistry of Q-particles in solution and in thin films is discussed.

Chapter 5. Artificial Photosynthetic Transformations Through Biocatalysis and Biomimetic Systems. By Itamar Willner and Bilha Willner (74 pages, 154 references). Light-harvesting molecules of linked donor−sensitizer−acceptor variants (D−S−A, S−A_1−A_2, D−S−A_1−A_2) are evaluated in terms of the quantum yield and lifetime of the charge-separated intermediate. Integrated systems can convert light into stored chemical energy. The efficacy of enzymes and cofactors (e.g., NADH/NAD) is discussed.

An index for the current volume followed by a cumulative index to Volumes 1−20 is included.

Christopher J. Abelt, *College of William and Mary*

JA955202N

Surfactants Europa: A Directory of Surface Active Agents Available in Europe, 3rd Edition. Edited by Gordon L. Hollis. Royal Society of Chemistry: Cambridge, U.K. 1995. xix + 459 pp. £80.00. ISBN 0-85404-804-9.

*Unsigned book reviews are by the Book Review Editor.

This completely revised and updated edition provides data on approximately 9000 trade names of surfactants sold and manufactured in Europe by approximately 80 different manufacturers. This book continues to provide access to up-to-date product information on surfactants manufactured and sold in Europe, giving information on surfactant type, suppliers, trade names, properties, and applications. The following data (where available) are given for each surfactant trade name: application, chemical class, chemical description, chemical name (CTFA name), cloud point, color, composition, chemical description, functionality, HLB number, ionic type, melting point, molecular weight, "N" number, pH, physical form, pour point, saponification number, supplier, surface properties, trade name, and viscosity.

JA955364J

Chemical Kinetics of Solids. By H. Schmalzried (Universität Hannover, Germany). VCH: Weinheim, Germany. 1995. xii + 422 pp. $175.00. ISBN 3-527-29094-X.

This book meets the expectations that are based upon the success of the author's highly esteemed monograph *Solid State Reactions*. In this new work the techniques of reversible and irreversible thermodynamics are effectively brought to bear on every imaginable type of process that involves the chemical reactivity of solids. Each category of process is treated in a rigorous and exacting fashion that results in each case in an equation describing the anticipated behavior. The result is a first-rate reference work that is a must for any science library. A chemist or materials scientist who is tackling a problem in synthesis, corrosion, phase separation, or, in fact, heterogeneity of any sort involving the solid state will find in this book insight and guidance concerning the most fundamental aspects of the processes. It is, as well as profound, well written and produced. Such highly technical material will never be easy reading, but in this case, the effort will pay off with significantly increased understanding.

H. F. Franzen, *Iowa State University*

JA955186U

Magnetic Ceramics. By Raul Valenzuela (National University of Mexico). Cambridge University Press: Cambridge, U.K. 1994. xix + 312 pp. $79.95. ISBN 0-521-36485-X.

There is a serious need for a comprehensive monograph in the rapidly developing area of magnetic ceramics, and Valenzuela's book represents a significant effort to meet this need. The book brings together a large body of data on various aspects of the science and technology of such ceramics. As an overview, it is of value to researchers in this area who can consult this monograph to find summaries and, in most cases, some literature references on specific properties, materials, and applications. However, the book is intended for use by senior undergraduate students and graduate students. In that respect, it falls short of achieving its goal. The result of the attempt to cover a large variety of subjects within a relatively short volume has been a text which is lacking in depth and, in a number of cases, in clarity. At best, certain sections may be used by students for supplementary reading, but this volume is not suitable for use as a textbook for either science or engineering students.

The book starts with an overview of the crystal structures of magnetic ceramics. The classification of these materials into spinels, garnets, and hexagonal ferrites is properly explained. However, the description of the various structures involved is very elaborate and is only suitable for readers with a strong background in crystallography. Individual sections in this chapter give the reader useful references on specific structures and the methods used in their characterization, but the discussion is focused on details too specific for this chapter to be instructive for a student or a general technical reader not having a strong background in crystallography. There is no introductory description of crystal classes and the basic principles of correlation between structure and properties. The next chapter, describing the preparation of magnetic ceramics, is more accessible, but even here the presentation is often more appropriate for a collection of brief overviews, resembling encyclopedia articles, than for an integrated text. The section on sintering overlaps with the section on microstructures in the previous chapter with rather confusing results. The first part of the next chapter, which describes the magnetic properties of ferrites, is the best part of the book. It describes, in fairly general terms, without excessive detail, the basic concepts involved in the magnetic behavior of materials. Indeed, the general reader would be well advised to read this part before attempting to tackle the beginning of the book. The next chapter, describing the applications of ferrites, again suffers from the use of a fragmented, highly specialized approach. The same can be said about the last chapter, describing other materials. Since the inclusion of other magnetic materials requires the introduction of even more concepts, this chapter shows even more strongly the tendency to address topics such as crystal growth, magnetic data storage and retrieval, STM/AFM, superconductivity, MRI, SQUIDs, etc., with a brief description of each subject which is not easily comprehended by the nonspecialist in the respective area. It would have been preferable to focus the entire book on clarifying the discussion of magnetic ceramics rather than to attempt to encompass all other types of magnetic materials.

In general, this book is of some use as a guide or a handbook for the specialist in magnetic ceramics. Both the organization of the book and flaws such as missing definitions and inadequate introduction of concepts make it unsuitable for use in teaching or self-study. However, there is still an urgent need for a clear and well-organized textbook in this area, and in fairness to the author, fulfilling this need would not be an easy task.

Aaron Barkatt, *The Catholic University of America*

JA945153Z

The Biological Chemistry of Magnesium. Edited by J. A. Cowan (The Ohio State University). VCH Publishers, Inc.: New York. 1995. xvi + 254 pp. $59.95. ISBN 1-56081-627-9.

The importance of the biological role of magnesium has been well accepted by the scientific and medical community. Magnesium (Mg) has a diverse coordination chemistry that impacts its role in regulation of enzymes and nucleic acid structure, as well as in catalytic activation of enzymes and ribozymes. It provides novel problems for membrane transport requiring specific magnesium selective ion channels. To date, little characterization of its impact on cellular regulation, including energetic metabolism, polynucleatide synthesis, degradation, and repair, has been published. The role of magnesium in nucleic acid biochemistry has rekindled the interest in this metal and stimulated the writing of this text.

The book contains 10 chapters written with special focus on each author's specific areas of interest. The authors did not attempt to be all encompassing in their reviews. Critical references were included into 1994 but were limited in total number. Importantly, the authors identified important problems and the approaches to be used to investigate them and provided critical comments to enhance the quality of their interpretation.

Several chapters applied physical methods to study the role of magnesium in nucleic acid and enzyme function. For example, (1) magnesium's role in biological activity, such as determination of binding constants for Mg ion, evaluation of the kinetics of binding, and a few comments on data treatment to prevent misinterpretation (an excellent chapter to stimulate young researchers); (2) use of transition metals and their complexes as probes to evaluate cofactor chemistry, to locate the metal binding site, to examine the coordination geometry, and to identify the mode of substrate binding and mechanism of action; (3) Mg−polynucleotide interactions allow folding of the nucleotides into their secondary and tertiary structure, evaluated relative to other ions to determine the essential nature of the complex, for biological functions (more than electrostatic interaction); (4) magnesium's presence in ribozyme required for the stabilization and optimization of the tertiary structure, magnesium−water complex as (for the most part) a general base toward ribose 5′O (when the leaving groups is ribose 3′O [the RNAse PRNA, Group I and II (probably) self splicing introns] magnesium's role is more complex: magnesium−water, magnesium coordination of 3′O and pro-5 phosphate oxygen to catalyze hydroysis).

Enzymes that catalyze the hydrolysis and formation of phosphodiester bonds underlie the processing of genetic information within the cell—transcription, translation, and replication of nucleic acids. Almost all of these enzymes require divalent Mg as an essential cofactor for optimal activity.

The chemical mechanism of Mg's role as a cofactor in enzymes involved in general metabolism was discussed. In glycolysis, enzymes appear to require two magnesium binding sites—one allosteric regulatory

site and the second a catalytic site. Primarily, the activated enzyme binds the substrate without the substrate itself having a high affinity for Mg. Phosphate transfer enzymes bind the Mg−nucleotide di- or triphosphates while additional Mg molecules stabilize the phosphate intermediates during transfer. Often these enzymes have a Mg site which provides structural integrity.

The genetics and molecular biology of Mg transport were examined. Magnesium was shown to participate in the regulation of membrane channel and receptor proteins, while hormonal regulation appeared to cause changes in the intracellular concentration of magnesium, altering magnesium flux. In enkaryotic systems, magnesium efflux was determined to be sodium dependent through a Na/Mg (2:1) antiport.

This book is an excellent contribution to the research field examining the role of Mg. The authors met their objective demonstrating the multifunctional use of Mg throughout the cell but emphasized its role in the nucleic acid system. The only concern was the fact that the editor had coauthored five of the 10 chapters; however, he not only contributed to the quality of the text but also strengthened the continuity of the presentation from chapter to chapter.

Overall, I would highly recommend this text to serious research scholars interested in magnesium chemistry and the mechanism by which magnesium functions in biological systems.

Wayne R. Bidlack, *California State Polytechnic University, Pomona*

JA9552398

Protein-Solvent Interaction. Edited by Roger B. Gregory (Kent State University, Kent, OH). Marcel Dekker: New York. xix + 570 pp. $185.00. ISBN 0-8247-9239-4.

This book is a compilation of several different manuscripts dealing with various aspects of protein−solvent interactions. It is not intended to be a comprehensive review, but to highlight the more recent discoveries and to identify unresolved problems in the field.

In Chapter 1, Rufus Lumry uses one-quarter of the entire book to describe a "knot" and "matrix" model of protein folding and uses this model to explain many aspects protein structure and stability. Edward Baker reviews what X-ray crystallographic studies have revealed about water binding to proteins in Chapter 2. The editor, Roger Gregory, uses Chapter 3 to examine a wide range of studies that deal with the hydration of proteins, focusing on how water acts as a "plasticizer" for the protein structure.

In the next chapter, Ronald Pethig discusses how the study of permittivity (dielectric constant) of water−protein mixtures can be used to identify several different types of water bound to proteins. Rayleigh scattering of Mossbauer radiation is the topic of the chapter by V. I. Goldanskii and Y. F. Krupyanskii. This interesting technique can be used to study movements in a protein with correlation times between 10^{-13} and 10^{-7} s. In Chapter 6, Williams, Rapanovich, and Russell evaluate the current literature on protein activity in essentially non-aqueous solvents. B. Gavish and S. Yedgar use the bulk of the next chapter to explain the theory of time-dependent viscosity and then spend a few pages discussing how these effects may be measured in proteins using the absorbance of ultrasonic energy. In Chapter 8, Doster, Kleinert, Post, and Settles discuss the flash photolysis of CO in myoglobin in both hydrated films and in water−cosolvent mixtures.

In Chapter 9, Arieh Ben-Naim reexamines the idea that hydrophobicity is the major force in protein folding and that hydrophilic interactions contribute little energy to the final state. He points out that a single favorable hydrophilic interaction contributes a large amount of energy when compared to a single hydrophobic interaction and concludes that more data are needed before a complete accounting of energy terms can be obtained. E. Grunwald and L. L. Comeford use several different non-protein model systems to discuss entropy−enthalpy compensation in Chapter 10. In the next chapter, Serge Timasheff uses classical thermodynamics to study the preferential binding or exclusion of cosolvent at the protein surface to explain the changes in stability due to the presence of osmolytes and many precipatants. In the following chapter, Winzor and Wills examine the same problem but use a statistical mechanical treatment that emphasizes excluded volume effects.

In the final chapter, Lovrien, Conroy, and Richardson point out that the classical protein purification method of precipitation from solvent mixtures is still alive and well in the industrial setting where chromatography of large volumes is simply not practical. Their chapter examines the molecular basis of different precipitation techniques with an eye toward the possible use in large-scale industrial processes.

As in any book of this type, one will find a few chapters that one wishes to read in depth and others that one will skim over. Overall, the editor has accomplished his goal of pointing out some of the current focal points in the field and identifying problems that still need to be solved.

Micheal H. Zehfus, *The Ohio State University*

JA9551493

Transition Metal Oxides. By C. N. R. Rao (Indian Institute of Science) and B. Raveau (École Nationale Superieure d'Ingenieurs, Univ. de Caen). VCH Publishers, Inc.: Weinheim, Germany, and New York. 1995. xii + 338 pp. $115.00. ISBN 1-56081-647-3.

The authors are well-known authorities in the solid-state chemistry community. Both have been leaders in research in this area for many years, having published many papers. Therefore, they can write on the subject of transition metal oxides with authority.

The book is designed to provide information regarding solid-state chemistry using inorganic transition metal oxides as the focal point. There are three main divisions to the book (with the percentage of pages of the book): (1) crystal structures (64%), (2) properties of the crystalline oxides (24%), and (3) preparative methods (12%). The authors make the point that crystal structures are crucial for understanding properties of the oxides and that syntheses can be designed knowing expected crystal structures.

The crystal structure part of the text begins with basic crystal structure. Crystal structure classes of the oxides are developed systematically from simple structures to very complex. The structures are principally analyzed using polyhedral structures of metal and oxide ions. To understand many crystal structures, the role of defects (point, line, and space) needs to be understood, and this is presented well in the text using many examples. Crystallographic shear structures and tunnel structures are covered. This section has many figures showing crystal structures which makes this part of the book very useful.

The section on properties of transition metal oxides begins with a general discussion of band theory for delocalized electrons and crystal field theory for localized electrons. Classification of materials into insulators, semiconductors, and metals using band theory is discussed. Magnetic and electrical properties are correlated with the crystal structure (a point that the authors wished to make). A good discussion of high-temperature superconductors is given (this is an area in which the authors are experts). In perovskite structures, cation−anion−cation interactions are significant. The use of electron spectroscopy with correlations to structure is briefly described. Nanomaterials, catalysts, and gas sensors are considered.

Preparation methods are catalogued. Several methods including solid-state reactions, use of precursors, topochemical and intercalation reactions, ion exchange, electrochemical, sol−gel, high-pressure reactions, and arc methods are described.

The authors succeeded in interlinking crystal structure with properties and synthesis methods. The book should provide a source for ideas in solid-state chemistry with adequate references for finding details about the methods. There are 278 references to the original literature with a useful index.

P. G. Wahlbeck, *Wichita State University*

JA955299D

Solid State Electrochemistry. Volume 5 of Chemistry of Solid State Materials. Edited by Peter G. Bruce (University of St. Andrews, Scotland). Cambridge University Press: New York. xvi + 344 pp. $84.95. ISBN 0-521 40007-4.

To chemists familiar with the tradition of solution electrochemistry in the U.S., the title *Solid State Electrochemistry* may seem a bit oxymoronic not unlike *Stable Compounds of Neon*. Despite this historical emphasis on solution phase electrochemistry, solid state electrochemistry is an area of increasing importance to modern technology. Areas such as batteries, fuel cells, sensors, and electrochromic devices all rely on ion or electron transfer through solid phases.

To my knowledge this is the only volume which brings together a large variety of topics relevant to all these areas.

The work contains several chapters on ion transport in crystalline and glassy solids and polymer electrolytes. Insertion electrodes and polymer electrodes are also covered in excellent chapters, fundamentals of double layers and transport are represented, and the book concludes with a chapter on applications. Many of the most important names in the field are represented as chapter authors including J. Goodenough, A. R. West, D. F. Shriver, W. Weppner, B. Scrosati, and R. D. Armstrong among others.

The volume in general emphasizes the fundamentals and concepts of solid state electrochemistry using particular materials as examples rather than being a compendium of materials properties. This emphasis will make this book useful as a text or supplemental text for a variety of solid state or electrochemical courses. Proton conduction and graphite intercalation are two topics not emphasized, but these are very large areas in themselves and other recent monographs are available which cover these topics.

I am often disappointed with multiauthor volumes where the editor has just put together the contributions as received. However, this is a multiauthor volume where the editor has clearly done his job of avoiding redundancy between chapters and keeping the nomenclature and symbols nearly uniform throughout the text and yet still providing a very broad coverage of topics. In summary, this is an important and valuable addition to the libraries of electrochemists and solid state chemists alike.

Bruce Parkinson, *Colorado State University*

JA955168C

Atomic Force Microscopy/Scanning Tunneling Microscopy. Edited by Samuel H. Cohen, Mona T. Bray, and Marcia L. Lightbody (U.S. Army Natick Research, Development, and Engineering Center, Natick, MA). Plenum Press: New York. 1994. x + 453 pp. $125.00. ISBN 0-306-44890-4.

This volume is a collection of 44 articles given at the First U.S. Army Natick Research, Development, and Engineering Center Atomic Force Microscopy/Scanning Tunneling Microscopy Symposium, held in June 1993. The title of the book, in this sense, is somewhat misleading. While one might expect broad coverage of the burgeoning field of scanning probe microscopy (SPM), rather one finds papers scattered irregularly across the field. A handful of these are given by leaders in the field (e.g., Colton and co-workers) and give a nice glimpse of some aspect of SPM. Others make up a relatively random selection. This volume will no doubt be useful to the attendees of the meeting as a means to remember the topics covered. The general utility of the volume will be much lower than a number of recent books which have deliberately covered the field broadly.

P. S. Weiss, *The Pennsylvania State University*

JA955243J

Pharmaceutical Design and Development. A Molecular Biology Approach. Edited by T. V. Ramabhadran (Neurogen Corp.). Ellis Horwood: New Jersey. 1994. viii + 337 pp. ISBN 0-13-553884-X.

This is a well-written overview, at an introductory level, of the basic elements of molecular biology that are relevant for a medicinal chemistry students, pharmacologists, or pharmaceutical scientists or managers. It provides basic introductory descriptions of recombinant DNA technology, monoclonal antibodies, expression, and characterization of proteins. The use of proteins as therapeutic agents is described using case studies that include insulin, human growth hormone, and hepatitis B vaccine. The power of expression of target proteins such as G-protein coupled receptors, transcription factors, and enzymes involved in signal transduction are overviewed nicely. Also covered are the use of molecular biological tools in the discovery of disease-causing genes, such as those in cystic fibrosis or Alzheimer's.

A section is devoted to the techniques involved in using X-ray and NMR structures of target proteins and their complexes with small molecules in an iterative process to improve therapeutic candidates. A chapter is also devoted to the use of nucleic acids as therapies, including such topics as viral vectors, antisense, and ribozymes. A section on transgenic animal models is followed by one on diagnostic applications of biotechnology and a summary statement on future prospects.

The material in this book is a very appropriate summary of the knowledge that anyone involved in pharmaceutical sciences who is a nonspecialist in molecular biology or biochemistry might be expected to have. It is highly recommended as a text for nonspecialists in pharmacy, pharmacology, or chemistry or for professionals within the industry that want to have a readable but accurate overview of the field with recent examples of the applications of the technology in practical examples.

Donald Hupe, *Parke-Davis/Warner-Lambert Company*

JA955257P

Intermetallics. Edited by Gerhard Sauthoff (Max-Planck-Institut). VCH: New York. 1995. xii + 165 pp. $80.00. ISBN 3-527-29320-5.

Intermetallics do not form a homogeneous group of materials, instead they comprise a wide variety of phases which differ drastically with respect to bonding, crystal structure, and properties. Therefore, in this monograph, the author has elaborated on the characteristics of intermetallics by referring to specific groups of intermetallics. Thus it provides an overview of intermetallics, which makes it attractive to a wider audience, including chemists with an interest in these materials. The fundamentals are discussed, as well as the respective applications of the various groups of intermetallics that have been been applied as structural or functional materials or are currently under investigation. After an introduction to bonding, crystal structure, and phase stability, the author elaborates upon the titanium, nickel, and iron aluminides and related phases: copper phases, the A15 phases, Laves phases, beryllides, Rare earth compounds, and silicides. Throughout the book, crystal structures, phase diagrams, physical as well as mechanical properties, and corrosion behavior are included. Future prospects for the intermetallics are outlined. The monograph has an extensive bibliography. The author of this monograph has done a good job in providing introductory as well as resource literature for chemists with an interest in this area of materials science.

Kenneth E. Gonsalves, *University of Connecticut*

JA955234A