Additions and Corrections

Measurement of Equilibrium Constants for Complex Formation between Phenol and Hydrogen-Bond Acceptors by Kinetic Laser Flash Photolysis [*J. Am. Chem. Soc.* **1996**, *118*, 6790−6791]. J. T. BANKS, K. U. INGOLD,* AND J. LUSZTYK

Equation 3 should read as follows:

$$\frac{1}{k^{A}_{PhOH/CumO}} = \frac{1}{k^{CCl_4}_{PhOH/CumO}} + \frac{K^{A/CCl_4}_{PhOH}[A]}{k^{CCl_4}_{PhOH/CumO}} \qquad (3)$$

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Book Reviews

NMR and Its Applications to Living Systems. Second Edition. By David G. Gadian (Institute of Child Health, London). Oxford University Press: New York. 1995. viii + 283 pp. $39.95. ISBN 0-19-855281-5.

The second edition of *NMR and Its Applications to Living Systems* by David Gadian provides an introductory level exposition of the basic spectroscopic and imaging experiments which, according to the preface, is geared to users who may not have a strong background in the physical sciences. In general, the presentation is directed at workers who are more comfortable dealing with verbal descriptions of parameters and variables than with more quantitative relationships. For example, the idea of a correlation time is introduced as a parameter which "expresses the characteristic time-scale of the molecular motion", without mention of the associated "correlation function". Similarly, the author discusses how "we might expect an ATP molecule to have a correlation time of about 10^{-10} s, and an enzyme of molecular weight 20,000 to have a correlation time of 10^{-8} s," without presenting the Stokes−Einstein relation.

Having dealt with introductory level researchers with more biological or medical backgrounds, the primary needs which such a book must fulfill are (1) a description of the basic information content of the NMR spectroscopic or imaging study; (2) a "how-to" discussion sufficient, at least, for researchers to reproduce experimental setups from the literature; (3) information on how to optimize the experiment; (4) a discussion of how the measured resonance intensities relate to the concentration of the corresponding compounds. These issues, in various forms, arise very early in the conception and implementation of biological NMR experiments, and even in the attempt of researchers in other fields to understand the significance of NMR studies in their research areas. The coverage of these topics in NMR and its applications to living systems is variable. Chapters 1 and 2 give a brief overview of NMR and the development of in vivo applications. Chapter 3 summarizes a number of metabolic studies, and explains, for example, the use of carbon-13 labeling to study substrate selection. Examples are drawn primarily from in vivo studies of muscle, brain, and tumors. Several interesting applications of the use of in vivo spectroscopy to diagnose metabolic disorders are presented. Chapter 4 presents an introduction to magnetic resonance imaging, and outlines the types of information which can be derived from imaging studies. A presentation of the fundamental concepts of NMR is delayed to Chapters 5−7, which appears to encourage the reader to get into the applications in a phenomenological way, and to gradually augment his understanding of the fundamentals as needed. In general, the approach followed is to give a brief discussion of the various topics, and to refer the reader to the literature for a more detailed analysis. While this strategy obviates having to deal with many of the thornier issues of in vivo NMR spectroscopy, it would have been more useful for the author to have provided a more detailed and critical evaluation of many of these topics. For example, a summary of some of the different approaches for determining metabolite intensities from NMR data could be presented, and their relative advantages noted. Instead, we are told that "numerous measurements of absolute concentrations are now emerging", and sent to the literature. The most extreme examples of this tendency to avoid specifics are the captions to Figures 2.10 and 2.11 which show resonances from cells and extracts and refer the reader to the literature for the assignments. This greatly reduces the information conveyed by the figures.

The presentation dealing with the practical aspects of setting up an NMR experiment is informative but light. Chapter 7 contains a discussion of the basic components of the NMR system and how they work. There is a useful discussion and figure (7.4) showing how to optimize signal/noise in a given time period if the T_1 of the compound is known. The theory on coil design mentions the rf absorption problems inherent in conductive samples, although little is said about decoupler heating or about the resulting difficulty of obtainining a uniform flip angle throughout the region of interest. From a physiological standpoint, the only discussion of how to set up samples involving cell suspensions (p 54) refers the reader to the literature. There is no significant discussion of the use of NMR to study transport or uptake rates, although there is some coverage of magnetization transfer methods. The presentation is adequate but dated, and does not reference the important recent advances made by Bulliman, Kuchel, and Chapman and by Perrin and Engler for the implementation of this type of study. Would the inclusion of such topics not be preferable to an Appendix covering vectors and complex numbers?

Despite these limitations, this book can serve as a useful introduction for biological and biomedical researchers, many of whom have reported finding the first edition both informative and stimulating. The presentation is helped by many colorful illustrations and diagrams. Researchers with a somewhat stronger physical background may want to consider the introductory level treatment by Hausser and Kalbitzer (*NMR in Medicine and Biology*; Springer-Verlag: New York, 1989) which, however, contains fewer examples of in vivo applications.

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Biohazardous Waste: Risk Assessment, Policy, and Management. By Wayne L. Turnberg (University of Washington). Wiley: New York. 1996. xiv + 422 pp. $74.95. ISBN 0-471-59421-0.

In the first sentence of the Preface, the author correctly notes that "the need to manage biohazardous waste safely has been recognized for decades". Closings of ocean beaches, restrictions on shell fishing, and prohibition on sludge dumping at sea are examples of regulatory actions taken to protect human health. Direct discharge of untreated sanitary wastes was a common practice, until recently.

In the summer of 1988, debris recognizable as medical waste washed up on beaches in many eastern states. This problem had been encountered earlier and had stimulated public and government concern

for the disposal of medical waste. Efforts to track hospital solid wastes had been unfruitful. Questions on composition, collection practices, and ultimate fate remained unanswered. The author suggested that the Medical Waste Tracking Act of 1988 (MWTA) was enacted quickly "in the heat of public concern". This statement in the Introduction follows the first paragraph that stresses public fear for the spread of human immunodeficiency virus (HIV). This overly simplistic prologue sets the tone for the book, i.e., pathways and controls on the transmission of AIDS and hepatitis B, to a lesser extent, from infected persons (sources) to receptors.

The text is a discussion of the content, implications, and requirements of Subtitle J of the Resource Conservation and Recovery Act of 1976 (RCRA) that speaks to biohazardous materials. Materials discharged to municipal treatment systems are *not* deemed biohazardous in the sense of MWTA; see page 44. Pathogen transport by wastewater, suspended solids, and solid waste streams receives little attention and is not cross−referenced to the extensive literature on health factors and disinfection in waste management systems.

Organization and editing have allowed errors and inconsistencies to remain, often distracting the reader. As an example, citation of reference 47 in the captions of Figures 2.1 and 2.2 creates a serious distraction. In the discussion of Health Hazard Assessment (Chapter 2), data tables and text are not integrated. The injury ranges reported in Table 2.2 for both hospital and nonhospital employees appear to be astronomical.

Failure to define key terms adds to the confusion surrounding some of the data. "Sentinal hospital studies", "seroprevalence", and "seroconversion" are not interpreted when first introduced. The *modus operandi* of HIV via invasion of CD4+ T-lymphocytes is stated without even modest explanation. Biohazardous wastes have broader significance; the audience for the book should not be viewed as only immunologists and public health specialists.

Failure to cite the CFR reference to the OSHA Bloodborne Pathogen Rule on page 31 causes a problem until the reader reaches page 66. More readers will have knowledge and/or ready access to copies of the CFR, as opposed to older editions of the Federal Register. In a comparable vein, the discussion of policy in Part II does not focus on the most common documentation and regulatory rules. It has great historical validity and may provide useful background for environmental law, but it fails to present clearly the common points and the diversities of agency regulations.

The great stress placed on category 4 wastes, i.e., sharps, is warranted. However, the general problem of "sharps" is more extensive than the control and management of AIDS and hepatitis. OSHA has shown great concern over the incidence of "cutting" and "piercing" accidents. Noninfectious injuries and treatable infections are common workplace occurrences and have resulted in extensive rule-making. Hazardous site workers and chemical process technicians risk exposure to toxic agents through penetration of personal protective equipment (PPE).

AIDS and hepatitis are frequently transmitted by blood or blood-related fluids. Bloody discards, bulk blood, and human and animal body parts are undoubtedly important mechanisms for disease transport. Transport of other body fluids as aerosols, colloidal suspensions, and films on microscale particulate matter has been tied to transmission of disease, also. The emphasis placed on blood as a disease vector detracts from attention to the significance of other hazards to public health.

Chapter 8 on Medical Waste Incineration fails to underscore the difficulty of medical waste incineration. Disinfection must be carried out under conditions that avoid inefficient combustion and unwanted byproducts; a suspected organic byproduct of incineration is 2,3,7,8-tetrachlorodibenzodioxin (TCDD). In addition, accumulation of metals on ashes is characteristic of incineration. These problems are in addition to pathogen removal.

Chapter 10 contains information derived from the vendors of alternative technologies. At best, this information is dated; at worst, descriptions may be optimistic sales claims. This chapter limits the book's use and life.

The book has a narrow focus; primarily, it provides background on control of AIDS-related biohazardous wastes. It is aimed at AIDS specialists. Chemists and chemical engineers with broader interests in hospital and health-related waste management and/or hazardous wastes, in general, will be less rewarded. It has limited potential as a reference or text.

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Free Radicals in Organic Chemistry. By Jacques Fossey, Daniel Lefort, and Janine Sorba (CRNS). Wiley: New York. 1995. xvi + 307 pp. $39.95. ISBN 0-471-95496-9.

This book is presented in four distinct sections. In Part 1 entitled General Concepts and Basic Principles free radicals are introduced and their detection, structure, and stabilities are discussed. In addition, steric and electronic factors influencing their fundamental reactivity patterns are considered. In Part 2 entitled Reactions: Classifications and Mechanisms the formation of free radicals and their fundamental reactions such as recombinations, disproportionations, substitutions, additions, rearrangements, and fragmentations are discussed. In Part 3 entitled Applications in Synthesis C−H substitutions, functional group transformations, multiple bond additions, cyclizations, aromatic substitutions, and coupling methodology are introduced. Part 4 contains general references that the reader can consult for more in-depth discussion of the topics introduced in the previous three sections. Also included in Part 4 is a collection of useful tables giving rate constants for a variety of free radical reactions, ionization potentials, and bond dissociation energies. In addition, the reader will be able to find sections devoted to discussions of radical kinetics, heteroatom-centered radicals, and important radical reactions in biochemistry and in industry.

The authors point out that their goal was to present a discussion of radical chemistry appropriate for advanced students and for established researchers who wish to learn the basics of radical chemistry. In this reviewers opinion, this goal has been achieved. This is a well-written logically presented introduction to free radical chemistry. The authors have chosen excellent examples to illustrate free radical chemistry and have skillfully presented them in enough detail to give the reader a firm foundation in free radical chemistry and at the same time to wet their appetite for more. This would make an excellent text for an advanced undergraduate or graduate level course in free radical chemistry.

Advanced readers, however, who are looking for detailed discussions of ESR, CIDNP, or radical ions, for example, will be disappointed. There are no references to the primary literature. The vast majority of references collected at the end of the book are for review articles discussing various aspects of free radical chemistry.

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