Complex **8**, thermally unstable (55 °C dec), slowly produces dimeric complex **7** in solution at 25 °C, a transformation that underscores the potential of this methodology for removing coordinated carbon monoxide ligands under exceedingly mild conditions.

Although this report apparently marks the first occasion that a nitrile oxide has been incorporated into a transition-metal complex, another class of 1,3-dipolar molecules, aryl and aroyl azides, were long ago reacted with Vaska's complex, *trans*-$(Ph_3P)_2(CO)IrCl$, to produce one of the first dinitrogen complexes, *trans*-$(Ph_3P)_2(N_2)IrCl$.[10] In light of our current findings, the mode of formation of this iridium-dinitrogen complex may involve 1,3-dipolar addition of the organic azide to the Ir-C(O) dipole in *trans*-$(Ph_3P)_2(CO)IrCl$ to form the five-coordinate metallacycle $(Ph_3P)_2(Cl)ArC(O)\overline{NN{=}NIrC}(O)$, which subsequently decomposes to the observed products . The formation of the dinitrogen complex *trans*-$(Ph_3P)_2(N_2)IrCl$ was originally proposed[10] to arise from a 1,3-oxidative addition of aroyl azide to the Ir center in *trans*-$(Ph_3P)_2(CO)IrCl$ followed by reductive elimination of aroyl isocyanate to generate dinitrogen complex.

The structural characterization of cycloadduct **3b** demonstrates the first unequivocal 1,3-dipolar addition to a polarized M=C bond. Decomposition of the cycloadducts described here under mild conditions portends a powerful route to unsaturated, low-valent metal complexes and clusters. The utility of this chemistry lies in the exploitation of the unsaturated metal complexes formed by this means and probable application of nitrile oxide reactions to other metal-carbon and metal-metal bonded species. Work in this and related areas continues and will be reported at a later date.

Acknowledgment. We gratefully acknowledge financial support provided by the Office of Naval Research (Contract N00014-76-C-0390). We also thank the National Science Foundation for the purchase of the Syntex P$\bar{1}$ diffractometer and the Bruker WP-200 NMR spectrometer.

Supplementary Material Available: IR and NMR spectral and analytical data (1 page). Ordering information is given on any current masthead page.

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[10] Collman, J. P.; Kubota, M.; Vastine, F. D.; Sun, J. Y.; Kang, W. *J. Am. Chem. Soc.* **1968**, *90*, 5430 and references therein.

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*Book Reviews**

Review of Textbooks for the "Brief" Organic Chemistry Course

(1) Introduction to Organic Chemistry. Third Edition. By D. Applequist (University of Illinois), C. H. DePuy (University of Colorado), and K. L. Rinehart (University of Illinois). John Wiley & Sons, New York, 1982. xiii + 343 pp. $22.92. (2) Organic Chemistry: A Brief Survey of Concepts and Applications. Second Edition. By P. S. Bailey, Jr., and C. A. Bailey (California Polytechnec State University). Allyn and Bacon, Inc., Boston, Mass. 1981 x + 418 pp. $20.95. (3) Introduction to Organic Chemistry. Third Edition. By W. H. Brown (Beloit College). Willard Grant Press, Boston, Mass. 1982. x + 493 pp. (4) A Short Course in Organic Chemistry. By E. E. Burgoyne (Arizona State University). McGraw-Hill Book Co., New York, NY. 1979. xii + 515 pp. $16.95. (5) The Essence of Organic Chemistry. By J. M. Cram and D. J. Cram (University of California—Los Angeles). Addition-Wesley Publishing Co., Reading, Mass. 1978. xv + 456 pp. $24.95. (6) Organic Chemistry: An Introduction. By J. E. Fernandez (University of South Florida). Prentice-Hall, Inc., Englewood Cliffs, NJ. 1982. xiv + 470 pp. $19.95. (7) Organic Chemistry: The Basis for Life. By B. Miller (University of Massachusetts). The Benjamin/Cummings Publishing Co., Inc., Menlo Park, CA. 1980. xv + 463 pp. $16.95. (8) Organic Chemistry. By J. D. Morrison (University of New Hampshire). Wadsworth Publishing Co., Belmont, CA. 1979. xii + 564 pp. $19.95. (9) Organic Chemisry: A Brief Contemporary Perspective. By C. W. Spangler (North Illinois University). Prentice-Hall, Inc., Englewood Cliffs, NJ. 1980. xv + 423 pp. $19.95.

The reviewer of textbooks designed for the "brief" organic chemistry course is faced with the same problems confronting the authors. The prefaces of these books reveal that there is no consensus as to the kind of students they should appeal to, nor is there agreement as to the extent or depth of coverage of the texts. Nevertheless, there does seem to be a consistency of style and content of all of these texts that make them relatively indistinguishable. Recognizing this, most instructors comtemplating a text adoption will consider only a few features as the basis for their decision. The true test, of course, is in the classroom. This reviewer has found, for example, that the Brown text has been effective for the past several years; but it is probable that any number of other texts would have served as well. As an aid to the instructor, five features (A–E) of the above texts have been examined, and those judged to be the most effective have been noted by a (+) in Table I.

Table I

	text feature analysis				
book no.	A	B	C	D	E
1	+		(+)	+	
2	+	+	+	+	+
3		+	+	+	+
4		+			
5	+			+	
6		+	+	+	
7					
8	+	+	+	+	+
9			(+)		+

A. Typography, Illustration, Etc. During the past decade authors and publishers have realized the pedagogical value of clear and attractive illustrations and typography. Effective use has been made of two-color, or contrasting shaded, high-lighted illustrations to emphasize important concepts, terms, structural features, reaction pathways, and mechanistic details. **B. Student Exercises.** The number and variety of problem exercises available to the student for review purposes appears adequate in all of these texts. Those noted in the table, however, were found to be either more thorough in their coverage or provided in-chapter review questions (some with answers and discussion) that were more likely to assure the students' mastery of the material. **C. Scope.** It is generally recognized that it is difficult to cover all of the material in the limited time normally available. It would appear that only the authors of the first text have attempted to limit the amount of material to what could reasonably be covered in one semester. The Spangler text is somewhat unusual in its organization being divided into "Core" and "Core Enrichment" sections. It is not clear in the absence of classroom testing how successful this approach might be. The other texts noted in the table provide an alternative means of coverage by placing special topics in supplementary sections or chapters. **D. Study Aids.** Most of the textbooks provide a separately published Student Study Guide, which gives the answers to the student exercises found in the text. The better of these also provides extensive discussions relating to study techniques and problem analysis. In this reviewer's opinion, the availability of a student study guide is a major factor in considering a text adoption. Since the Study Guides were not reviewed here, the table is more indicative of the presence of additional study aids such as glossaries, summaries of reaction types, and other review discussions. The Applequist text is the only one that includes an index of reactions not only according to functional groups but also arranged by expected organic products. **E. Spectroscopy.** With the increasing importance of spectroscopy to organic chemistry, it is surprising that most of the texts do not include more than a brief discussion. Only the Brown texts attempt to incorporate an optional dis-

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* Unsigned book reviews are by the Book Review Editor.

cussion of spectroscopy at the end of each chapter.

O. Bertrand Ramsay, *Eastern Michigan University*

Ion Exchange and Solvent Extraction. Volume 8. Edited by Jacob A. Marinsky (State University of New York at Buffalo) and Yizhak Marcus (The Hebrew University, Jerusalem). Marcel Dekker, Inc., New York. 1981. xi + 438 pp. $55.00.

In this volume, one of a continuing series, the emphasis is on solvent extraction.

One third of the space is devoted to a chapter on Electrical Phenomena in Solvent Extraction by Scibona, Danesi, and Fabiani of the National Committee on Nuclear Energy, Rome, Italy. The authors have deliberately decided to emphasize certain results related to phase boundary potentials and liquid membranes in order to present clearly a number of concepts. This has resulted in an incompleteness of coverage of the subject within the chapter. However, readers are directed to an historical review of the subject among the references. Investigators working in fields dealing with ion-selective electrodes and electrical phenomena in biological membranes should find this chapter especially useful.

The chapter titled Metal Extraction with Hydroxyoximes, by Whewell and Hanson, might better be titled The Extractive Metallurgy of Copper Using Hydroxyoximes. Anyone interested in this topic should find this chapter quite valuable, not only for the text presented but also for the extensive and up-to-date bibliography. In addition, the preparation, purification, and chemical properties of commercially important hydroxyoximes are reviewed. Besides copper, there is mention of the use of hydroxyoximes in the extraction of cobalt, nickel, germanium, platinum group metals, molybdenum, and vanadium.

The chapter titled Extraction with Solvent-Impregnated Resins, by Warshawsky, deals with hydrophobic metal-binding extractants incorporated inside solid carriers. The impregnation may take place either subsequent to the synthesis of the resin or by incorporating the extractant during the polymerization process. Attention is given to the preparation and properties of impregnates on synthetic macroporous carriers. Clays and other supports are touched on briefly. Analytical applications and technological separations are described. A short description of the progress made in the area of solvent polymer membranes and liquid membranes is included.

Both the beginner and the master will find the chapter titled Solvent Extraction of Elements of the Platinum Group, by Gindin, very helpful. The major classes of extractants used for the solvent extraction of Ru, Rh, Pd, Os, Ir, and Pt are discussed. Although literature references beyond 1971 are not given, the bibliography up to that time seems to be well selected and useful.

In the final chapter, titled Solvent Extraction from Aqueous-Organic Media, by Hala, the author points out the differences and, in many cases, the advantages of replacing the aqueous phase by a mixture of water with an organic solvent. Such a phase is referred to as the polar phase. These organic water-miscible solvents change the properties not only of the aqueous phase but also of the organic phase as a result of their partition between the polar and organic phases. Although the scope of this chapter does not make it feasible to deal in detail with all phenomena taking place in such extractions, the author, by the use of selected examples from the literature, does show a few processes such as ion solvation, ion pairing, and complex formation. There is a table summarizing effects playing a role in extractions from aqueous-organic media, with references. Literature as late as 1979 is cited.

James J. Markham, *Villanova University*

Laser Spectroscopy of Solids. Volume 49. Topics in Applied Physics. Edited by W. M. Yen and P. M. Selzer. Springer-Verlag, Berlin, Heidelberg, New York. 1981. 310 pp. $58.50.

This volume represents a combined effort of contributions from theorists (e.g., T. Holstein, D. L. Huber, S. K. Lyo, and R. Orbach), experimentalists (e.g., P. M. Selzer, M. J. Weber, and W. M. Yen), and scientists of combined interest (e.g., A. H. Francis, G. F. Imbusch, and R. Kopelman). It consists of seven chapters. The first chapter attempts to describe the electronic structure of ionic inorganic and molecular solids. Chapters 2 and 3 give theoretical discussions of incoherent energy transport in disordered solids. Chapter 4 discusses the recent techniques of laser spectroscopy as applied to the study of solids. The high resolution spectroscopy of ionic solids is discussed in Chapter 5. The results of laser fluorescence line narrowing techniques as applied to the study of the electronic structure of ionic impurities in glasses are discussed in Chapter 6. Dynamics of energy transfer in molecular disordered solids is discussed in Chapter 7. Below, we discuss in more detail the contents of the different chapters.

The first chapter by Imbusch and Kopelman treats semitheoretically the spectroscopy and the dynamics of ions and molecules at low and high concentrations. At low concentrations, the origins of the homogenous and inhomogeneous line widths are qualitatively discussed. The selection rules for radiative and nonradiative processes within an ionic system (in particular, rare earth ions) are discussed. The intermolecular energy transfer processes—resonance vs. phonon assisted, Anderson localization, percolation—are all qualitatively introduced. This chapter is an introduction to the different topics discussed in the remaining chapters of the volume. The difference in the language used in the ionic and molecular fields was very clear in this chapter. No effort was made in correlating, the different work done in the two fields, e.g., percolation and Anderson delocalization or the work on the energy gap law in molecular and ionic systems.

In Chapter 2, Holstein, Lyo, and Orbach discuss quantitatively phonon assisted (as contrasted with resonant) radiative and nonradiative energy transfer processes. These processes are encountered frequently between ions or molecules in disordered systems. Expressions are derived for one- and two-phonon-assisted processes. For two-phonon-assisted processes, they discussed a new mechanism of transfer in which one phonon interacts with the donor and one phonon interacts with the acceptor. The rate of this type of transfer is found to be independent of the mismatch of the excitation energy of the donor and the acceptor. The authors discuss briefly the difference between nonradiative phonon-assisted energy transfer and the Förster–Dexter resonant type energy transfer. They also point out that while phonon-assisted nonradiative transfer dominates at high concentrations, radiative transfer dominates at low concentrations and could be concentration independent.

Chapter 3 by Huber discussed the interplay between theoretical models and their approximate solutions and experimental results for two different type systems. In the first system, transfer takes place between the same chemical species as observed in spectral diffusion studies with laser fluorescence line narrowing techniques. The second system is an older type of study in whyich donor–donor energy transfer finally leads to trap excitation. Hopping and diffusion behavior are discussed and a review of past theoretical and experimental results is given. In the donor–donor transfer, approximate solutions of the author's work are compared with numerical exact solutions and with experimental results.

Chapter 4 discusses the different modern experimental laser spectroscopic techniques, e.g., fluorescence line narrowing, hole burning, polarization, and coherent transient, photoacoustic, and transient grating. The importance of these techniques in studying the homogeneous line width as well as spectral diffusion within the inhomogeneous profile has been carefully discussed. This is a well written and useful chapter for experimentalists in this field. Only one deficiency can be pointed out. The author could discuss some of the line narrowing experiments carried out on molecular systems (e.g., those by Personov and others) in order to keep up the spirit of the book in trying to combine studies on molecular and ionic systems.

Yen and Selzer discuss in Chapter 5 some of the results obtained by using some of the techniques discussed in Chapter 4, in particular fluorescence line narrowing and echo techniques. The chapter is divided into three parts. In the first part, most of the discussion centered on the results of the homogeneous line width of ions in two crystals, Ruby ($Al_2O_3{\cdot}Cr^{3+}$) and $LaF_3{:}Pr^{3+}$. In the second part, the use of FLN techniques in resolving fine structure, side bands due to assisted transitions (e.g., those associated with magnons), and in resolving site selected spectra are discussed with examples given in each case. In the last part, and perhaps the most important, the study of the intra- (low concentration) and interionic (high concentration) dynamics is discussed, again with most of the focus on Ruby and $LaF_3{\cdot}Pr^{3+}$.

In Chapter 6, Weber gives an excellent clear review of the laser induced fluorescence studies of rare-earth ions in glasses. He discusses the structure of glasses as it affects the electronic structure of the rare-earth ions. Spectroscopic results and dynamic (energy transfer) results are discussed. The role played by the homogeneous and by the inhomogeneous line widths in the making of rare-earth ion-glass type lasers is briefly discussed.

In Chapter 7, Francis and Kopelman discuss the spectroscopy and dynamics of excitation in molecular solids. Excitons, phonons, and polarons are briefly discussed. Line shapes of absorption of a few "one dimensional" crystals as well as a few mixed crystals are shown and examined. A good discussion of disordered molecular solids where the disorder results from mixing isotopically substituted systems (e.g., C_6H_5D in C_6D_6, $C_{10}H_8$ in $C_{10}D_8$, ...) is also given in this chapter. The use of the percolation theory in describing the energy migration in these systems is explicitly discussed.

In summary, this volume combines interesting recent studies on ionic systems with some discussion of results on the molecular systems. The volume has successfully integrated the studies on the ionic systems (Chapters 2 through 6), but, unfortunately, the first chapter could not succeed in integrating the last chapter with the rest of the book. In fact, the first chapter was itself not well integrated. This in no way reflects the authors' abilities, but rather is a result of the fact that the two fields have been developing independently for such a long time that such integration process becomes rather difficult. Recently, however, there is a strong attempt to integrate international meetings in these two fields. This volume is indeed a good start and should greatly assist towards reaching that goal.

M. A. El-Sayed, *University of California, Los Angeles*

Nuclear and Radiochemistry. Third Edition. By G. Friedlander (Brookhaven National Laboratory), J. W. Kennedy (Washington University), E. S. Macias (Washington University), and J. M. Miller (Columbia University). John Wiley and Sons, Inc., New York. 1981. xii + 684 pp. $42.00.

This book represents a welcome update of the second edition of the text "Nuclear and Radiochemistry" published in 1964. As indicated in the preface, this edition, like its predecessors, attempts to address two groups of readers, those embarking on a career in nuclear and radiochemistry as well as scientists from other disciplines who wish to learn how to apply nuclear techniques to their particular fields of study. The book is well suited for use by both audiences; in addition, it will serve as a good basic reference for anyone involved in the study of nuclear phenomena of both a pure and an applied nature.

The first chapter contains a historical survey of the early experiments with natural and artificial sources of radioactivity beginning with the discoveries of Becquerel and the Curies. Also included for orientation is a brief discussion of radioactive decay and growth and a description of the principal types of radioactive decay. The next six chapters comprise the core of this text and contain much of the basic information required for an advanced undergraduate or first graduate course on nuclear and radiochemistry. These chapters discuss the basic properties of the nucleus, the various types of radioactive decay and growth, and the interaction of radiation with matter. The organization of these topics in the aforementioned sequence represents a significant improvement over the second edition in which some of the applied topics were introduced prematurely, before some of the basic information required for their understanding. The material is presented at a level that is suitable for both its intended audiences; it is sufficiently comprehensive for the neophyte nuclear chemist but not too obscure to be appreciated by workers in applied fields.

With the exception of the chapters on nuclear models and statistics, the second half of this book is devoted to the applied aspects of nuclear and radiochemistry. This part of the book has been almost completely revised to reflect many of the new developments in nuclear science which have occurred since the publication of the previous edition. A chapter on radiation detection and instrumentation, for example, highlights the properties of lithium-drifted and intrinsic semiconductor detectors and describes their impact on various fields of nuclear research. Of particular merit is the expanded treatment of such diverse topics as nuclear astrophysics and radiochemistry applied to nuclear medicine. The chapter on nuclear energy is particularly timely and includes a discussion of the problems of nuclear waste disposal and reactor safety as well as the radiochemical aspects of fuel reprocessing.

There are many new illustrations in this edition that are quite effective in describing basic concepts and, in later chapters, in depicting advances in experimental techniques. At the end of each chapter there are a series of problems of varying difficulty. Also included is a list of references to more advanced texts and review articles as well as to original reports describing significant experimental advances.

It is worth noting that the second edition of "Nuclear and Radiochemistry" is perhaps the most well worn book in my personal library, having first seen duty when I was a graduate student in nuclear chemistry and subsequently having been used as a reference for the instruction of workers in an applied field, nuclear medicine. In light of the updated information contained in the third edition and its improved organization, it seems likely that this edition will suffer a similar fate both on my bookshelf and in the hands of others working in the various fields of nuclear science.

Michael R. Zalutsky, *Harvard Medical School*

Organic and Bio-organic Chemistry of Carbon Dioxide. Edited by Shohei Inoue (University of Tokyo) and Noboru Yamazaki (Tokyo Institute of Technology). Kodansha Ltd., Tokyo, and John Wiley and Sons, New York. 1982. xii + 280 pp. $49.95.

The goal of understanding in detail the reactions of carbon dioxide in living organisms is of the utmost importance, considering the central role these reactions play in sustaining life on this planet. What better way to approach the subject than by bringing together all that the chemist has learned about the reactions of carbon dioxide, followed by a chapter describing the important enzymic reactions, followed in turn by a final chapter in which the mechanisms of the enzymic reactions are discussed in terms of models provided by the organic chemist? The publishers, editors, and authors of this volume must be credited with an excellent idea. The book does not quite do justice to the idea.

One problem is no fault of the authors, but simply reflects the fact that there are huge gaps in our understanding of CO_2 chemistry. There have been few systematic studies of the reactivity of CO_2 toward simple nucleophiles, electrophiles, and cycloaddends. We know qualitatively that CO_2 is reactive toward nucleophiles, that the reactions are often difficult to observe because of unfavorable equilibria, and that the mechanisms appear to resemble those involving other electrophilic carbonyl compounds. But how does the reactivity of CO_2 compare with that of other electrophiles? How effectively does it discriminate among nucleophiles derived from carbon, oxygen, nitrogen, sulfur, etc.? Careful work in this area of physical-organic chemistry is badly needed.

In their survey of organic reactions the authors have chosen to say little about decarboxylation. Considering the reversible nature of enzymic carboxylations this decision appears hard to justify. A mechanistic description of the function of carbonic anhydrase or biotin carboxylase, for example, must trace the course of both forward and reverse processes. It is no more logical to seek models for such reactions among those that consume CO_2 than among those that produce it. There is a short section (pp 23–25) concerned with decarboxylation of β-keto acids, but there is no discussion of mechanism, and the kinetic data presented are "unpublished results" from the author's laboratory. In any presentation of this topic it is inexcusable to ignore the papers by Pedersen and Westheimer (to name only two) which made this reaction a classic example of a model useful to the biochemist.

Also missing from the survey are cycloaddition reactions of CO_2. There are now several examples of such additions (Padwa, Schmid) as well as more examples of the reverse process, indicating that many cycloaddition–cycloreversion reactions of CO_2 follow allowed low-energy pathways, but that thermodynamics disfavors the forward reaction with most cycloaddends. A recognition of this reaction pathway might be useful in approaching the formulation of biochemical mechanisms of carboxylation.

An unusual feature of Dr. Haruki's chapter on Organic Syntheses with Carbon Dioxide is the inclusion of a large body of quite detailed research results from the author's laboratory. This material has evidently not been available previously except in the Japanese literature, and its presentation in English may serve a practical purpose for Western students working in this field. For most readers there is far more detail than is needed to document the conclusions. In this chapter and elsewhere the authors offer little critical evaluation of the literature, and the reader is sometimes left with the feeling that a lot of chemistry has been described but that few unifying principles have emerged.

The final chapter on model reactions is particularly well written. One wishes that Professor Inoue had expanded the treatment to point out more explicitly the many interesting mechanistic puzzles that remain.

This reviewer found the book stimulating and thought provoking, despite the shortcomings cited. The emphasis is decidedly bioorganic, but investigators in the field of organometallic and synthetic chemistry may also find the book well worth reading.

Martin Stiles, *University of Kentucky*

Fundamentals of Enzymology. By Garfield P. Royer (Ohio State University). John Wiley & Sons, New York. 1982. xii + 232 pp. $22.50.

This book is seriously and irredeemably flawed. An overwhelming number of shortcomings, many of a fundamental nature, cause it to confuse, rather than enlighten, the student. In the first place, the author does not appear to understand basic chemical principles. A meaningless and unexplained distinction is made between irreversible and reversible chemical reactions. In one chemical mechanism a pair of π electrons is used as a base. Elsewhere, an allosteric activator causes an increase in the sigmoidicity of an idealized curve of substrate saturation. Second, facts are often presented with no explanation of their meaning. A reader who is already thoroughly familiar with the field would understand the author's purposes, but the uninitiated student would be rapidly lost. This is a subtle trap; the professor choosing a text might scan this book, see that all of the traditional topics are presented, and adopt it for his course. A related difficulty is the author's habit of completely changing the subject in midparagraph. Statements appear suddenly with no obvious transition, as if a stack of index cards covering observations related to a general topic were shuffled and the order of presentation determined by the deal. Third, equations and mathematical derivations are copied correctly from original texts, but no understanding of the meaning of the parameters within them is conveyed to the reader. For example, the Michaelis constant is one of the parameters that defines a given, abstract curve assigned to a set of data by numerical analysis. The parameter itself does not change with a variation in the choice of mechanism, only the molecular meaning assigned to it. Fourth, no explanation of the molecular conclusions that can follow from specific observations is given. It is never pointed out that steady-state kinetics by themselves can only provide information about the order of entry of substrates and of exit of products into and from the active site, respectively. To the contrary, it is implied, incorrectly, that the existence and rates of conversion of all intermediates in an enzymatic mechanism can be determined by steady-state measurements. Unfortunately, the critical kinetic methods that can reveal many of these facts, namely rapid, pre-steady-state techniques and determinations of isotope exchange, are never described, while one-fourth of the book is devoted to derivations of the far less informative classical equations. Fifth, important statements are made without the references necessary to substantiate them. It would be very interesting to learn in which enzymatic reactions histidine functions as a nucleophile. Sixth, whole sections of this book are essentially paraphrases of similar discussions presented in Jencks, W. P. "Catalysis in Chemistry and Enzymology", McGraw-Hill, New York, 1967. Although copious references to this other text occur, several figures copied directly from the earlier work are not credited. Furthermore, the paraphrases presented here, rather than clarifying the earlier presentations either muddle them or fail to convey their often profound insights. Seventh, the figures in this text are usually counterproductive. Most of them come from earlier publications, but the explanations which accompanied them previously are not reproduced here. All of them are very familiar to the members of the field and, as such, the need for a detailed legend might be overlooked. Again, however, the student, unfamiliar with the primary texts, would be confused. Furthermore, many serious errors in transposition have been made. For example, in one figure the elements of sulfur and selenium are seen to undergo transmutation. Finally, perhaps the most regrettable aspect of this book is that the author has provided no unique, personal insights into the topics discussed. The book is simply a reiteration of basic concepts from primary sources and the years that he has spent organizing and thinking about this subject have not yielded the new and original point of view all authors must strive to create.

This should not be construed as an exclusive list of the shortcomings or even a complete collection of the most serious. It would be unwise to use this book as the text for a course or to purchase it for inclusion in the library of a university.

Jack Kyte, *University of California, San Diego*

Chromatography of Environmental Hazards: Drugs of Abuse. By Lawrence Fishbein (National Center for Toxicological Research). Elsevier Scientific Publishing Co., New York, NY, and Amsterdam. 1982. vii + 496 pp. $95.75.

The abuse of chemical substances, while not as involuntary as the ingestion or inhalation of water and air pollutants, is indeed an environmental hazard to many in today's society. This volume, the last of a series, provides an extensive review of the published methods for chromatographic analysis of both legal and illicit drugs.

The book covers depressants, including alcohol, narcotics and analgesics, stimulants and hallucinogens, giving both analytical methology and information on the synthesis, toxicity, and chemical and biological properties of each of the drugs. While the chromatographic methods are not given in detail, sufficient information is provided for the analyst to determine the usefulness of the method for the problem at hand, with equipment, reagents, and an outline of the method given. Gas chromatography, high-pressure liquid chromatography, GC–mass spectrometry, and thin-layer methods are described for various applications.

While the references are extensive, there appears to be a dearth of state-of-the-art methods. For example, in the analysis of such complex samples as biological extracts, one would expect to see more frequent reference to the use of high-resolution methods, such as capillary column GC. Perhaps this is not as much a reflection on the thoroughness of the author's literature search as it is a measure of the length of time it takes for the most recent developments in chromatography to be adopted in the clinical laboratory.

This book should prove to be invaluable to the analyst setting up a method for determination of any of the drugs of abuse, whether in their pure forms, in street mixtures, or as metabolites in body fluids or tissues.

Barbara B. Kebbekus, *New Jersey Institute of Technology*

Books in the ACS Symposium Series

Metal Bonding and Interactions in High Temperature Systems, with Emphasis on Alkali Metals. Edited by J. L. Gole and W. C. Stwalley. American Chemical Society, Washington. 1982. x + 629 pp. $54.95.

This book contains 35 chapters deriving from a symposium held in 1981. The chapters are arranged in four groups: Bonding and Interactions of Alkali Metal Atoms and Dimers; Metallic Bonding Exemplified by Alkali and Other Small Metal Clusters; Bonding and Interactions of Alkali Hybrids and Halides; and Alkali Metal and Alkali Compounds Vapor Applications.

Nuclear and Chemical Dating Techniques: Interpreting the Environmental Record. Edited by L. A. Currie. American Chemical Society, Washington. 1982. xi + 516 pp. $48.95.

This book contains 23 chapters expanded from the lectures given at the symposium in 1980, augmented by an introduction, Nuclear Dating: An Historical Perspective, by the late William F. Libby, to whom the volume is dedicated. The largest group of chapters is collected under the heading Advanced Dating Techniques: Cosmochemical and Geochemical Applications. Seven chapters come under the second heading, Natural Archives: Interpreting the Isotopic and Chemical Record, and six chapters are grouped under the heading Chemical Evolution, Extinction, and Archaeology. In addition to an index, there is an appendix which is a guide to the contents of the chapters and which also identifies some papers given at the symposium but not included in this volume.

Inorganic Reactions in Organized Media. Edited by S. L. Holt. American Chemical Society, Washington. 1982. x + 254 pp. $31.95.

The 14 chapters in this book are constructed from presentations made at a symposium held in 1981. Most of them are concerned with the effects of colloidal media (microemulsions) on the selectivity of chemical reactions, with special attention to their relevance to solar photochemistry.

Mössbauer Spectroscopy and Its Chemical Applications. Edited by J. G. Stevens and G. K. Shenoy. American Chemical Society, Washington. 1981. xiii + 642 pp. $69.95.

The lectures given at a 1980 symposium have been expanded to form the 29 chapters in this book. They are grouped under these headings: Chemical Bonding; Conversion Electron Mössbauer Spectroscopy; Environmental Applications; Biological Applications; Isotopes Other Than Iron-57 and Tin-119; Phase Analysis; and Energy and Catalyst Applications.

Short-Lived Radionuclides in Chemistry and Biology. Edited by J. W. Root and R. A. Krohn. American Chemical Society, Washington. 1981. xii + 547 pp. $72.95.

A symposium held in 1979 generated the 28 chapters comprising this volume. They are grouped in the following categories: Chemical Reaction Mechanisms; Kinetics of Chemical Reactions; ^{13}N Radiobiochemistry; ^{11}C and ^{18}F Radiobiochemistry; and Microbiological and Environmental Applications. Roughly half of the contents is thus biologically oriented and half chemically oriented.

Sulfur: New Sources and Uses. Edited by M. E. D. Raymont. American Chemical Society, Washington. 1982. x + 261 pp. $33.95.

In 1981, a symposium was held to consider the problems associated with the potentially unavoidable increase in production of sulfur as a consequence of the use of sulfur-containing fossil fuels. The lectures were expanded to form the 14 chapters in this volume. Some of the chapters deal with production of sulfur, some with the impact of supply on the sulfur industry, and some with new applications of sulfur.

Asymmetric Reactions and Processes in Chemistry. Edited by E. L. Eliel and S. Otsuka. American Chemical Society, Washington. 1982. xiii + 300 pp. $31.95.

A U.S.–Japan seminar held in 1981 provided the basis for 18 papers and 9 "short communications" comprising this volume. The overall scheme is synthesis of chiral organic compounds in high optical yield, utilizing the varied techniques that have been introduced in the past 10 years.

Amionic Polymerization: Kinetics, Mechanisms, and Synthesis. Edited by J. E. McGrath. American Chemical Society, Washington. 1981. xiii + 592 pp. $45.95.

A 1980 symposium of the ACS Division of Polymer Chemistry provided the foundation for this volume, which contains 35 chapters contributed by chemists from universities, government laboratories, and industry.

Flue Gas Desulfurization. Edited by J. L. Hudson and G. T. Rochelle. American Chemical Society, Washington. 1982. 432 pp. $41.95.

This volume is developed from a symposium sponsored by the ACS Division of Industrial and Engineering Chemistry.