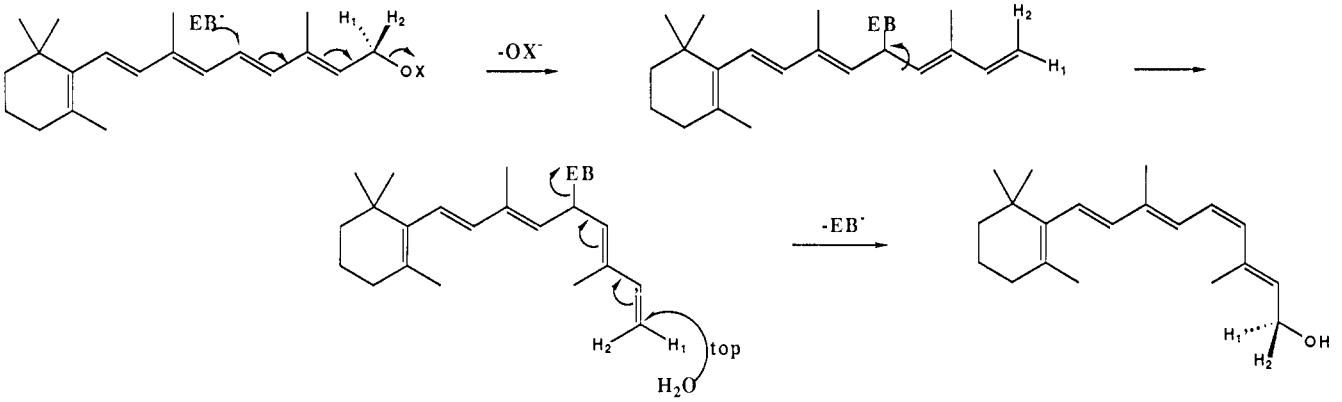
Scheme II. Same Face C–O Cleavage and Reformation Causes Apparent Stereochemical Inversion



Is the same situation found in the bovine case? Here the situation is more complex because there are likely to be multiple *all-trans*-retinol dehydrogenases.[7] However, the situation is somewhat simpler for the 11-*cis*-retinol dehydrogenase, where only one enzyme is expected. No significant 11-*cis*-retinol dehydrogenase activity was detected in the bovine rod outer segment membranes. All of the enzymatic activity was found in the pigment epithelium. This dehydrogenase behaved as in the amphibian case, with the enzyme being *pro*-S specific (Figure 1B). The *all-trans*-retinol dehydrogenases, both from the rod outer segments and from the pigment epithelium, were *pro*-R selective, but substantial processing of the *pro*-S H also occurred. This suggests that the different *all-trans*-retinol dehydrogenases show different stereochemistries with respect to the nicotinamide cofactor. Since it is clear that the stereochemistries for the *all-trans*- and 11-*cis*-retinol dehydrogenases can be opposite, it was of interest to determine the equilibrium constants for the two redox reactions. This measurement was made because a controversial but mechanistically appealing proposal has recently been made which argues that in alcohol dehydrogenases whose natural substrates are known—at least those that are simple and unconjugated—a formal relationship exists between the stereochemistry of the reducing hydrogen of NADH and the redox equilibrium constants of the substrates.[8,9] "Thermodynamically unstable carbonyls are reduced with the *pro*-R hydrogen of NADH, while thermodynamically stable carbonyls are reduced with the *pro*-S hydrogen."[8] It was of interest to determine if this relationship is relevant to the retinals. The redox equilibrium constants were measured for *all-trans*- and 11-*cis*-retinol and they proved to be virtually identical and belong to the thermodynamically stable category (Table I). Therefore, at least for the retinols, it is not apparent what catalytic significance the stereochemistry of reduction might have.

Acknowledgment. This work was supported by United States Public Health Service Grant EY 04096.

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Book Reviews *

Fluorescence and Phosphorescence Spectroscopy: Analytical Chemistry by Open Learning. By David Rendell (Wolverhampton Polytechnic). John Wiley & Sons: New York, 1987. xix + 419 pp. $29.95. ISBN 0-471-91381-2 (paperback).

This book constitutes a thorough introductory treatment of the theory, instrumental and chemical methods, and practical considerations involved in luminescence spectroscopy. It is a self-learning guide and so is not a text book in the traditional sense. The book is divided into five chapters including an introduction followed by more specific sections covering differential practical aspects. The introduction is a general overview of photophysics, which by the way is quite good considering the more simplified approach used. The nature of excited states, solvent interactions, and energy-transfer phenomena are all discussed in enough detail to allow the reader to make predictions as to experimental outcomes. The second chapter addresses the instrumentation required to perform fluorescence and phosphorescence spectroscopy. The analysis of basic spectrofluorimeter designs, the types of sample cells required, etc. are covered quite adequately.

The next two chapters cover all aspects of photoluminescence methods of analysis. The first of these deals wtih quantitative fluorimetry. Discussed here are calibration curves, inner filter effects, quenching effects, photodecomposition, and limits of detection as related to blank luminescence and scattering. The second of these two chapters is the chemical approach to solving quantitative analysis problems. Direct, derivative, and quenching methods are each discussed in turn. Taken as a whole, these two chapters apparently sum up the important aspects of quantitative fluorimetry.

The final chapter is really quite a surprise for an introductory type text. The author has included methods that are not "tried and trued". Addressed are pre- and post-column derivative techniques used for chromatography, use of micellar solutions for fluorescence and phosphorescence, and cyclodextrin systems.

This book is intended to teach basic analytical photoluminescence methods without taking a formal class. As such, there are numerous problems throughout the text that readers can use to tests themselves before reading on. I find this book to be very practical for independent study and will (have) recommend it to both graduate and undergraduate students. Although there are many graphs and data sets that the reader must interpret, thereby gaining a working knowledge without actually using an instrument, there are also four experiments in the last chapter. These experiments are particularly well detailed.

Stephen E. Bialkowski, *Utah State University*

*Unsigned book reviews are by the Book Review Editor.

Biological Organization: Macromolecular Interactions At High Resolution. Edited by Roger M. Burnett (College of Physicians and Surgeons, Columbia University, New York, New York) and Henry J. Vogel (College of Physicians, and Surgeons, Columbia University). Academic Press, Inc: Orlando, FL. 1987. xiii + 359 pp. $81.50. ISBN 0-12-145948-9.

This is a multiauthored volume on selected aspects of macromolecular interactions of biologic relevance resulting from a symposium conducted in June 1985 at the Harriman Campus of Columbia University. This text contains 23 separate chapters covering five themes, including the following: (1) DNA–protein interactions; (2) viral organization and structure; (3) antibody–protein and protein–protein interactions; (4) light-sensitive proteins; and (5) membrane proteins and signaling. This volume both benefits and suffers from issues typically present in texts written by multiple authors and directly compiled by one or two editors. The authors are international experts in their respective fields and have done a commendable job of concisely presenting both an appropriate historical perspective and new foci of research in their areas. Excellent chapters on the left-handed double helix of DNA, DNA–protein recognition, viral structure, antigen–antibody interactions, the structure and function of photosynthetic reaction centers, and the structure and organization of the LDL receptor are present which are clear, concise, and well-illustrated. On the other hand, the weak points of this book are that there is little commonality shared between individual chapters other than the global title, many important areas of biological macromolecular interactions have been completely omitted (out of necessity), and the lack of significant numbers of references after 1985 in rapidly explosive fields limits the utility of the listed references to one of background and historical perspective. On the whole, chapters are logically organized and are easily interpretable by non-specialists in each field, providing enjoyable and refreshing reading.

In summary, each chapter provides easily readable excerpts from a large cross section of research on biological macromolecular organization which should substantially increase the scope and diversity of knowledge of investigators in related fields. I would recommend this book to scientists looking for a general introduction to salient issues in biological macromolecular interactions.

Richard W. Gross, *Washington University*

Reactions of Sulfur with Organic Compounds. By M. G. Voronkov, N. S. Vyazankin E. N. Deryagina A. S. Nakhmanovich and V. A. Usov (Institute of Organic Chemistry, Siberian Division of the Academy of Sciences of the USSR, Irkutsk, USSR). Edited by J. S. Pizey (formerly of the University of Aston, Birmingham, England). Consultants Bureau (Plenum): New York. 1987. xvii + 421 pp. $79.50. ISBN 0-306-10978-6.

The authors cite many reviews about reactions of sulfur with organic compounds but hasten to point out that their book is the first comprehensive presentation of the subject. Editor Pizey adds that much of the material is not readily accessible to Western scientists, including unpublished research, and that the book should be useful to industrial as well as to academic chemists, since topics such as dyes and vulcanization are considered. The encapsulation of the authors as to the contents needs no elaboration:

> This review is divided into eight chapters covering the basic physical (Chapter 1) and chemical properties (Chapter 2) of elemental sulfur, its reactions with hydrocarbons (Chapter 3), organic halides (Chapter 4), organic sulfur-containing compounds (Chapter 5), oxygen-containing compounds (Chapter 6), nitrogen-containing compounds (Chapter 7), and organic compounds of other elements (Chapter 8). Each chapter contains an exhaustive bibliography. An effort has been made to include all the literature published up to the beginning of 1981.

In contrast to the style of many reviews, that of this one is graceful and neither staccato nor stilted. The writing shows no trace of a language problem, ordinarily is quite clear, and is about as interesting as such a compilation can be. The authors usually do a good job of organizing, summarizing, and tying like things together. With somewhat over 2500 references, the book unquestionably qualifies as a monumental effort that seems unlikely to be duplicated soon. The only sources that overlap somewhat are "Elemental Sulfur" (B. Meyer, Ed., 1965) and "Mechanisms of Sulfur Reactions" (W. A. Pryor, 1962).

Spot checks succeeded on items one would expect to find, but with a few exceptions. For example, in view of the abundant information contained about elemental sulfur, one wonders why nothing is included about isotopes. Similarly, reactions of lead thiolates with sulfur are not included in the thorough treatment of other such organometallics, although such reactions long have been known to afford smooth syntheses of disulfides.

Information sometimes must be sought by way of the table of contents and a page-by-page check rather than through the index. The healthy 33-page index is based mainly on names and classes of compounds and often contains no entry for important items well treated in the text. Thus there is no entry for thiyl, radical, or ESR, although the text deals with free radical reactions in profusion. Nor are there entries for the root "photo-", or for carbonyl sulfide, singlet, or triplet, although there is good coverage for the important production and reactions of singlet and triplet forms of sulfur by photolysis of carbonyl sulfide. For this reason, especially, an author index would have been helpful, so that a desired reference could be acquired by recollection of an author's name.

The authors do not merely catalog reactions, and they are properly critical of reported results in numerous instances and are usefully interpretive in other instances. When they are skeptical, they are not reluctant to make their skepticism clear. Criticism is not always feasible vis-ă-vis the often complex reactions, however, because it is not possible always to separate the good "sheep" from the (probably numerous) "goats" that produce dubious yields of impure products of uncertain structure. The frequency with which yields are given implies that the authors included them whenever they were reported.

Mechanisms, like yields, appear to be included if they appeared in the papers cited. Many, however, obviously originated with the present authors; these are reasonable and stimulate insight and ideas. It does seem unfortunate though that the mechanism of the Willgerodt–Kindler reaction is not given more attention, overall, in one place even though consequences are scattered about abundantly in various chapters.

Only a couple of dozen typographical errors were noticed, not bad for so long and complex a book. Readers should be wary of citing references without checking, however; thus Ralf Steudel is repeatedly cited as R. Stendel and several other misnomers include *V.* Kirmse for *W.* Kirmse and Cymerman-*Graig* for Cymerman-*Craig*. Entries in a useful 20-page table of reactions of organometallics are tangled for 2- and 3-lithiothiophenes. Aside from a misplaced radical (p 161) and Table 6.2 for 6.3 (p 227), other typos are trivial.

On the whole, this book is an excellent one and is a valuable contribution to the chemistry of sulfur. Good libraries should acquire it. Individuals working with reactions of elemental sulfur will find it useful at their elbow as a source of prior work, criticism, mechanistic and other ideas, and abundant references.

Lamar Field, *Vanderbilt University*

Annual Reviews of Physical Chemistry. Volume 38. Edited by Herbert L. Strauss (University of California, Berkeley), Gerald T. Babcock (Michigan State University), and C. Bradley Moore (University of California, Berkeley). Annual Reviews Inc.: Palo Alto. 1987. x + 621 pp. $32.00. ISBN 0-8243-1038-1.

This book is the latest in the highly affordable, eminently readable collection of essays on diverse topics in physical chemistry and related sciences. Like its recent predecessors, the lead article is a scientific autobiography, this year by Kenneth S. Pitzer. It is almost impossible to single out some chapters to cite as illustrations of the content of this book without fear of omitting others of comparable interest and importance.

Having quite arbitrarily chosen prime numbered essays, here is such an abridged, illustrative list of topics and authors: Rydberg molecules (Herzberg); electron microscopy (Cowley); chemical vapor deposition (CVD) (Jasinski, Meyerson, and Scott); elementary reactions at the gas–liquid transition (Schroeder and Troe); alkalides and electrides (Dye and DeBacker); polymer concentrations at interfaces (Rondelez, Auserrê, and Hervet); pyrazine and radiationless transitions (Kommandeur, Majewski, Meerts, and Pratt); atmospheric radicals (Anderson). It is clear that physical chemistry is an ever-alive, ever-expanding discipline. It is also clear that this volume of *Annual Reviews of Physical Chemistry* both reflects this vitality and adds to it by being affordable, current, readable, and thus generally respected in the chemical community at large.

Joel F. Liebman, *University of Maryland Baltimore County*

Advances in Heterocyclic Chemistry. Volume 43. Edited by A. R. Katritzky. Academic Press: New York. 1988. ix + 353 pp. $95.00. ISBN 0-12-020643-9.

This latest volume in the series contains six contributed chapters, of which one, on the Quantitative Analysis of Steric Effects in Heteroaromatics (by R. Gallo, C. Roussel, and M. Berg), makes up more than one-third of the volume. It is subdivided into sections on rates and equilibria, intramolecular steric effects, relations between intra- and intermolecular steric effects, and general applications in synthesis. Another chapter, by V. N. Charushin, O. N. Chupakhin, and H. C. Van Der Plas, bears the ambiguous title Reactions of Azines with Bifunctional Nucleophiles: Cyclizations and Ring Transformations. In fact, it is not

concerned with azines (derivatives of aldehydes or ketones and hydrazine) but with six-membered aromatic heterocycles containing nitrogen. The dinucleophiles treated range from amines and metal amides to examples in which the nucleophilic sites are separated by up to four other atoms, and which may have N, O, or S at the sites.

A chapter by D. Hewitt is titled "Azaphosphorines", but in the editor's preface it is referred to as "azophosphorins". The former is used by Chemical Abstracts, and the IUPAC recommended term, preferred by many Journals, is "azaphosphinines". The chapter deals with six-membered rings containing at least one N and one P in the ring, and is the first comprehensive review of such compounds. 4-Azaazulenes are reviewed in a chapter by W. Flitsch, who brings the subject up to date from a review by Mosby in 1958. Flitsch also contributes a chapter on hydroporphyrins, which were last reviewed in 1975; the burgeoning interest in the subject justifies a new review after such a short interval. The title "Reactions of Annular Nitrogens of Azines with Electrophiles", a chapter by M. R. Grimmett and B. R. T. Keene, if used in a permuted title index, could lead to false information retrieval, for, like the chapter by Charushin, Chupakhin, and Van Der Plas, it deals not with azines, but with six-membered aromatic heterocycles containing nitrogen. (If a collective term for such rings is really needed as an alternative to the circumlocution just used, might one consider "azinines", which incorporates the -in- infix used in the generalized Hantzsch-Widman system for naming heterocyclic rings?) Much of this short chapter is devoted to alkylation, but it also treats protonation, acylation, N-oxidation, and N-amination.

The book maintains the high quality of content and presentation characteristic of the series, but it is devoid of indexes.

Phenylpropanolamine—A Review. By L. Lasagna (Tufts University). John Wiley & Sons: New York. 1988. III + 440 pp. $40.00. ISBN 0-471-81977-8.

The author's intent has been to develop a "critical review" in which published information on "phenylpropanolamine" (norephedrin, 1-phenyl-2-aminopropan-1-ol) is put into "accurate, balanced, scientific perspective". In addition, the book was intended to inform regarding phenylpropanolamine's pharmacological actions and expected side effects.

The book has five chapters: 1. History; 2. Chemistry; 3. Basic Pharmacology; 4. Safety; 5. Clinical Efficacy Studies and Author and Subject indices.

The chapter on Safety includes animal and human safety studies as well as adverse reactions to phenylpropanolamine, details of deliberate overdose cases, and adverse interactions with other drug classes.

This book probably belongs in the library of any organization selling products containing phenylpropanolamine.

Donald E. Butler, *Warner-Lambert/Parke-Davis Research*

Starch: Properties and Potential. Critical Reports on Applied Chemistry. Volume 13. Edited by T. Galliard. John Wiley and Sons: New York. 1987. VIII + 151 pp. $59.95. ISBN 0-471-93126-X.

The editor and authors of this book are to be congratulated on producing, within a relatively slim volume, a comprehensive account of the major aspects of starch properties that are important in the domain of starch chemistry and technology.

This volume is a collection of only five chapters published for the Society of Chemical Industry. The first chapter (15 pages) deals with starch availability and utilization. This introductory review by T. Galliard is especially timely, given the rapid advances of European starch technology.

Chapter 2 (38 pages), by J. M. V. Blanshard, entitled "Starch Granule Structure and Function: a Physiochemical Approach", deals with the physical chemistry of starches during the gelatinization process, the variations in gelatinization behavior of different kinds of starches, and the non-equilibrium aspects of gelatinization.

Chapter 3 (23 pages), by T. Galliard and P. Bowler, entitled "Morphology and Composition of Starch", deals with the internal structure of starch granules, the major and minor components, and the effects of minor components (protein, lipids) on properties of starch and starch hydrolyzates.

Chapter 4 (35 pages), by P. Colonna, A. Buleon, and C. Mercier, is entitled "Physically Modified Starches". Modification of starch structure with conservation of the granular shape and with destruction of the molecular shape and other modifications at the molecular level are the topics of this chapter.

Chapter 5 (33 pages), by J. F. Kennedy, J. M. S. Cabral, I. Sa-Correia, and C. A. White, is entitled "Starch biomass: a chemical feedstock for enzyme and fermentation processes". This excellent review provides the reader with an abundant listing of starch degrading enzymes, industrial application in starch processing, as well as fermentation processes. This chapter demonstrates the considerable growth in interest in biotechnological aspects of carbohydrate chemistry for the industrial production of carbohydrate polymers (cyclodextrins, pullulan, scleroglucan, xanthan gum) and other industrial chemicals (ethanol, citric and lactic acid).

The scope of the book encompasses many aspects of starch properties and appears to be adequate; however, the proper carbohydrate nomenclature is not always followed. For instance, starch contains no "anhydroglucose" units. In fact, they are D-glucopyranosyl units. The text is nearly error-free; however, a few errors are evident.

Illustrations and figures are used well to illustrate the text and aid in understanding. The reference list in every chapter is extensive (over 570 total references) and almost fully up to date. The book includes a subject index but no author index.

Overall, this volume is of interest to such specialists as biochemists and carbohydrate chemists and will be a worthwhile addition to their library of starch chemistry and technology.

Zbigniew J. Witczak, *A. E. Staley Manufacturing Co.*

Methods in Molecular Biology. Volume 3. New Protein Techniques. Edited by John M. Walker (The Hatfield Polytechnic, UK). The Humana Press Inc.: Clifton, NJ. 1988. xv + 531 pp. $49.50. ISBN 0-89603-126-8.

With the advent of genetic engineering and hybridoma technology, new techniques in protein chemistry have been developed to cope with the increasing demands of molecular biology and immunology. Both molecular biologists and immunologists, as well as biochemists, are required by their research to apply these techniques to their problems. This series of books, *Methods in Molecular Biology*, is an attempt to present to these investigators detailed descriptions of methodology at the interphase of protein chemistry and molecular biology. This particular volume, New Protein Techniques, supplements and continues the theme of Volume 1 on Proteins.

This book contains a detailed selection of analytical and preparative methods not covered in the earlier work. The topics include protein separation and detection, purification and quantitation, cleavage and modification, as well as peptide synthesis and enzyme immobilization. The inclusion of immunological methods is particularly attractive to those interested in the application of immunoassay analysis. This collection provides an excellent source-book of practical guidance to these special techniques. Each protocol is preceded by a brief description of its basic theory which provides useful information to the first-time users. The methods section presents a detailed step-by-step procedure with notes of caution to alert the experimenter of any problems. Such detailed easy-to-follow protocol guarantees any researcher to succeed the first time. Each chapter also furnishes a list of references for further information on the method. In addition, the extensive Index at the end of the volume gives an easy cross-reference to these techniques.

Despite the page limitation of the text, there is an extensive coverage of the isoelectric focusing methodology (6 out of 38 chapters), which may be a bit excessive. The presentation on Purification of DNA-Dependent RNA Polymerase and the chapter on Computer Analysis of 2-D Electrophoresis Gel would only be useful to a few specialized investigators. In general, however, the techniques are well selected to suit the needs of those interested in protein chemistry. Together with Volume 1, this book forms a sister companion that will be valuable to the novice as well as the experienced researcher.

Shan S. Wong, *University of Lowell*

Introduction to Organic Spectroscopy. By J. B. Lambert (Northwestern University), H. F. Shurvell (Queen's University), D. A. Lightner (University of Nevada), and R. G. Cooks (Purdue University). Macmillan Publishing Company: New York. 1987. x + 454 pp. $27.50. ISBN 0-02-367300-1.

The increasing importance of spectroscopic methods as a structural probe in organic chemistry is now evident even in recent textbooks in general organic chemistry, most of which now offer more than a cursory treatment of this topic. However, given their broader objective, these textbooks can provide no more than a meaningful, but limited introduction. The next step in sharpening the student's problem-solving skills using these now ubiquitous spectroscopic tools is a single treatment that embraces the four major techniques: nuclear magnetic resonance, vibrational spectroscopy, electronic absorption spectroscopy, and mass spectrometry.

Introduction to Organic Spectroscopy is one of several applicable texts for such a course to appear recently. This book is essentially a revision of one that appeared in 1976. Intended for a one-semester course, it assumes no prior exposure to spectroscopy and provides brief reviews of selected topics in organic chemistry, for example, stereochemistry, which is central to an understanding of the application of NMR.

Presentation of each of the four techniques follows the same general pattern. Basic concepts, experimental methods, and instrumentation are

discussed initially. This is followed by an in-depth treatment of the central topics pertinent to each method: chemical shift and coupling constant in NMR; group frequencies in vibrational spectroscopy; chromophores in electronic spectroscopy; and molecular weight determination and molecular fragmentation in mass spectrometry. Finally, the applications of these techniques to the solution of structural problems are numerous, timely, and instructive. There are problem sets and answers for each of the four methods. The section on mass spectrometry contains a large number of solved problems that will be very helpful to the student. Extensive tables correlating spectral properties with structural features are included, as well as many useful quantitative relationships for predicting spectral properties (e.g., Shoolery's and related NMR rules, and Woodward–Fieser UV rules).

A welcome feature is the inclusion of informative introductions to the most current techniques in each of the four instrumental methods, for example, two-dimensional NMR, NMR imaging, chiroptic methods, and tandem mass spectrometry. Raman spectroscopy is given the attention it deserves in recognition of its enhanced importance in structure studies and its greater availability since the application of laser technology.

The last section of the book is a series of structure characterization problems in which spectral data from all four methods are presented. The solution of such problems comprises an important next step in skills development. Little guidance in approaching these problems is given and no solved problems are included. I believe the student would benefit from the addition of such material.

The authors strike an appropriate balance between fundamental and applied material that serves not only to introduce students to problem solving at an intermediate level but also to prepare them for more challenging problems and to build the foundation required to facilitate their understanding and appreciation of the advances in these fields that are sure to come. The book is also sufficiently rich in timely information to serve as an introduction to the four spectroscopic methods for the practicing scientist.

Morton E. Munk, *Arizona State University*

Radiochemistry. By Cornelius Keller (University of Karlsruhe). Ellis Horwood Limited: Chichester, UK. 1988. i + 208 pp. $69.95. ISBN 0-7458-0522-1.

The author presents many of the diverse aspects of modern radiochemistry in a concise format. The topics covered in the book range from fundamental definitions and equations to the very recent work on the production and decay of the heaviest elements. This results in terse treatment of all the material. The book places a strong emphasis on the heaviest elements. The reactions used to produce these elements are described in detail, as well as their decay properties. For example, the recent discovery of the radioactive emission of ^{14}C is briefly mentioned. Presentations of modern fission and fusion reactor designs and applied radiochemistry are also included. The "quick march" pace is not suited to a novice, even though elementary material is included in the book. Rather, the book could serve the role of providing an overview of recent forefront radiochemical research to advanced undergraduate and beginning graduate students. The treatment is too shallow for the book to be considered as a reference for practicing radiochemists.

David J. Morrissey, *Michigan State University*

Volume of Proceedings

Physics of Solid Surfaces 1987. Studies in Surface Science and Catalysis 40. Edited by J. Koukal. Elsevier: Amsterdam, Oxford, and New York. 1988. xix + 365 pp. $142.00. ISBN 0-444-42972-7.

This volume is the proceedings of the Fourth Symposium on Surface Physics, held in Czechoslovakia in 1987. It consists of 22 invited papers and a large number of "short contributions", reproduced from typescript, and not indexed.

Catalysis of Organic Reactions. Edited by Paul N. Rylander, Harold Greenfield, and Robert L. Augustine. 1988. xi + 441 pp. $99.75. ISBN 0-8247-7927-4.

This collection of papers, in uniform typescript, derives from a conference held in Savannah, Georgia, in 1986. Five papers are devoted to homogeneous catalysis, five to heterogeneous catalysis, four to preparation of amines, and seven to "selected" reactions and topics. Among these are papers on organometallics, surfactant synthesis, preparation of catalysts, etc. Well indexed.

Infrared Microspectroscopy: Theory and Applications. Edited by Robert G. Messerschmidt and Matthew A. Harthcock. Marcel Dekker: New York. 1988. 288 pp. $85.00. ISBN 0-8247-8003-5.

Two symposia held in 1986 provided the eighteen papers in this volume. They are largely reports of original research, accompanied by some experimental description, and are grouped under the following headings: "Instrumentation Considerations and Technique Advances in Infrared Microspectroscopy", "Analysis of Polymers by Infrared Microspectroscopy", "Applications of Polarized Infrared Microspectroscopy", "Application of Infrared Microspectroscopy to the Semiconductor Industry", "Application of Infrared Microspectroscopy to Biological and Pharmaceutical Research", and "Miscellaneous Applications of Infrared Microspectroscopy". Well indexed.

Photosensitisation. Molecular, Cellular, and Medical Aspects. Edited by Guiliana Moreno, Roy H. Pottier, and T. George Truscott. Springer-Verlag: Berlin, Heidelberg, and New York. 1988. viii + 521 pp. $132.10. ISBN 0-387-18554-2.

A NATO Advanced Study Institute held in Ontario in 1987 gave rise to the large number of short reports of original research reproduced from typescript in this volume. An 11-page index, curiously composed of but one column per page, is a helpful guide to the contents.