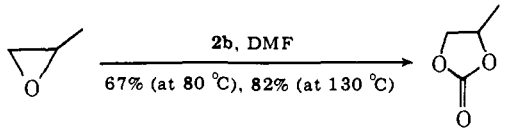
nearly stoichiometric amount of water, may be considered to have been brought about by the following factors: (i) stability of both **2** and **4** toward water, (ii) some tolerance of **5** to the stoichiometric amount of water and regeneration of **4** and cyclohexanone by the hydrolysis of **5**, (iii) stability of **7** to the stoichiometric amount of water. **2b** also transcarboxylated its CO_2 moiety to propylene oxide to produce propylene carbonate[16] (eq 1). These are the first examples of the transcarboxylation reaction by means of a transition-metal-bicarbonato complex.



(1)

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(7) Identification data of **2b**: Cu content 17.0% (calcd 17.0%); CO_2 evolution by acidolysis 99.1%; IR (Nujol) 2602 (ν_{OH}), 2162 ($\nu_{N\equiv C}$), 1618 cm^{-1} ($\nu_{C=O}$).

(8) Owing to the high sensitivity of **3b** to moisture, recrystallization of **3b** was not successful and the exact number of the coordinated *t*-BuNC ligand was not determined. Identification data: CO_2/Cu ratio, 0.51, which was determined from Cu content by iodometry (4.23 mmol/g) and CO_2 gas evolution by acidolysis (2.14 mmol/g); IR (Nujol) 1511 ($\nu_{C=O}$), 2164 and 2189 cm^{-1} ($\nu_{N\equiv C}$).

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(10) Identification data: Cu content 79.7% (calcd 78.9%); H_2O formation by acetolysis 91%; allyl alcohol formation by the reaction with allyl bromide 24%. HOCu was solubilized in organic solvents by the addition of a ligand (L) such as PEt_3 or *t*-BuNC. The resulting solution of the Cu(I)–hydroxo complex (**4**) showed the IR ν_{OH} band at 3300 cm^{-1}. However, the isolation of the $HOCu{\cdot}L_n$ complex was unsuccessful. For the preparation of CuOH, see also P. Bevillard, *Bull. Soc. Chim. Fr.*, 561 (1956).

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(14) **7** was prepared in situ in DMF by adding 3 equiv of PEt_3 to the isolated complex **11**.[13]

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(17) Throughout this study, the yields of conversions in percentages were determined by GLC analyses. Estimated error in their percentages is within 5%.

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Book Reviews

Neutron Diffraction (Topics in Current Physics, 6), Edited by H. DACHS (Hahn-Meitner-Institut für Kernforschung, Berlin). Springer-Verlag, Berlin. 1978. 357 pp. ~$29.

On encountering a book entitled "Neutron Diffraction", the alert reader will immediately want to know how it compares with the classic volume by G. E. Bacon, the Third Edition of which was released by the Oxford University Press in 1975. The answer is that Bacon's book starts from first principles and may be used as an introductory text, while the volume under review consists of chapters on specialized topics by prominent workers in the field (although the first chapter, written by Dachs, is a useful introduction).

The chapter of most interest to chemists is the one by Coppens, describing the combined use of X-ray and neutron crystallographic data to map charge-density distributions. The technique thus gives direct information about chemical bonds—differences between single, double, and triple bonds are apparent, lone-pair electrons may be visualized, and theoretical results may be tested. G. Zaccaï has contributed a chapter on the application of neutron diffraction to biological problems. Much of his emphasis is on the technique of small-angle scattering, which is discussed at greater length in the chapter on disordered systems, written by W. Schmatz. P.-A. Lindgård reviews the contributions of neutron diffraction to the study of phase transitions and critical phenomena. Other chapters deal with polarized neutrons (J. B. Hayter), the investigation of magnetic structures (W. Prandl), and liquid structures (P. Chieux), and with applications (including neutron interferometers) of the theory of dynamical neutron diffraction (H. Rauch and D. Petrascheck).

Reproduced directly from typescript, this book is comparatively inexpensive and may well be purchased by some readers with a strong interest in one or more of the topics covered.

C. V. Berney, *Massachusetts Institute of Technology*

Comprehensive Chemical Kinetics, Volume 20; Complex Catalytic Processes, Edited by C. H. BAMFORD and C. F. H. TIPPER (University of Liverpool). Elsevier Scientific Publishing Co., Amsterdam. 1978. xii + 414 pp. $98.00 (subscription price $85.00).

This series of volumes on chemical kinetics has been appearing over the past ten years, and is providing a valuable compendium of facts and theories, written by experts. Section 8 of the series, comprising four volumes, is concerned with heterogeneous reactions, and Vol. 20 is the second in this section; the first, dealing with simple surface processes, has not yet appeared—possibly because such processes are hard to find.

The volumes in this series have consistently maintained a high standard, and this volume is no exception. As usual, the editors have chosen authors who are knowledgeable and diligent, and who are skillful in presenting their material in simple and clear language.

The volume contains only three rather lengthy chapters, with 79 illustrations, 109 tables of data, and copious references. Chapter 1, by Geoffrey Webb, deals with "Catalytic Hydrogenation", and appropriately begins with an account of the nature of the metal catalysts and a helpful summary of theories of heterogeneous catalysis, including applications of activated-complex theory. The hydrogenations of olefins, alkynes, dienes, and cyclic molecules are dealt with in detail, and the chapter concludes with a thoughtful discussion of the influence of geometrical and electronic factors.

The second chapter, by K. van der Wiele and P. J. van den Berg, on "Heterogeneous Oxidation Processes", deals mainly with work done since 1970, previous work having been reviewed elsewhere. There is a thorough discussion of the oxidations of ethylene and propene, followed by accounts of the higher olefins, aromatic hydrocarbons, methanol, ammonia, and sulfur dioxide. Again, there are many helpful comments on the role of the catalysts and other theoretical aspects.

Chapter 3, on "Heterogeneous Eliminations, Additions and Substitutions" is by L. Beránek and M. Kraus. There is a comprehensive review of dehydration, deamination, dehydrohalogenation, alkylation by olefins, esterification, hydrolysis, and several other processes. These reactions occur on solid acid–base catalysts, and there is considerable emphasis on the analogies with liquid-phase reactions catalyzed by strong mineral acids, and on carbonium ion mechanisms.

As usual, the publishers have done a competent job and have produced a volume of attractive appearance. Books of this kind, which convert information into knowledge, are invaluable to advanced students and to active workers in the field. The price, however, makes it unlikely that the book will have a wide distribution other than to libraries.

K. J. Laidler, *University of Ottawa*

Analytical Laser Spectroscopy, Edited by NICOLO OMENETTO (University of Pavia). John Wiley & Sons, New York. 1979. xi + 550 pp. $34.95.

The concept of "Analytical Laser Spectroscopy" was immediately appealing to me because it is the first book that strives to bring together the divergent analytical applications of lasers in a single volume. I believe that this effort is successful with a few exceptions.

In Chapter 1, Sacchi and Svelto discuss the basic principles of lasers with particular emphasis on their unique properties such as collimation, power, tunability, and coherence. The basic concepts are explained and amply illustrated but I would not recommend this chapter to someone with a minimal knowledge of lasers. Another disturbing feature of this chapter is the inadequate coverage of *laser-pumped* dye lasers. This is corrected in some of the succeeding "application" chapters.

Analytical spectroscopy using laser atomizers is discussed by Laqua in Chapter 2. This chapter is very informative and contains useful practical information which probably does not appear in journal papers on the subject. The author's comparison of laser microprobe and electron microprobe analysis is revealing in light of the similarity of the techniques' names. Laqua makes a definitive case for the unique capabilities of the laser for development of analytical procedures which were hitherto unavailable for optical spectrochemical analysis.

Piepmeier discusses atomic absorption spectroscopy using laser sources in Chapter 3. Superficially, it appears there is little to be gained by the use of a laser source, but the author points out the unique aspects of laser radiation which make it much more than just a replacement for a hollow cathode lamp. His discussion of the measurement of line profiles by laser atomic absorption is supplemented by a lucid discussion of line profiles and line broadening.

Omenetto and Winefordner cover analytical atomic fluorescence spectroscopy with laser excitation in Chapter 4. Much of this material has appeared in similar form in other monographs. The more recent use of laser-induced atomic fluorescence as a diagnostic tool for combustion processes is also discussed.

In Chapter 5, molecular absorption and fluorescence are discussed by Demtröder. This chapter departs from the stated theme of the book, e.g., laser-induced molecular reactions are discussed. This is not a serious fault except that the coverage of some relevant areas is minimal. This chapter seems to be slanted toward gas phase spectroscopy, and the coverage of solution fluorescence induced by laser excitation is disappointing. The methods of obtaining "tunable" radiation from single-frequency lasers are well-covered and provide useful information.

The analytical uses of lasers in remote sensing are discussed by Measures in Chapter 6. Laser techniques for remote sensing are more highly evolved than many of the methods described in this volume. The author begins at an appropriate level for novices (with a scientific background) and effectively uses diagrams and photographs to illustrate the technology involved in remote sensing. He avoids the jargon that sometimes makes the current literature in remote sensing incomprehensible.

Chapter 7 by Cova and Longoni is an introduction to signals, noise, and measurements. The aim of this chapter is to outline the theoretical foundations of relevant measurement techniques and signal processing methods to provide an insight into the parameters which characterize the quality of data obtained.

Recent advances in analytical laser spectroscopy are addressed by Keller and Travis in Chapter 8. This chapter is a necessary adjunct to Chapters 3, 4, and 5 and covers specialized topics such as laser intracavity absorption, condensed phase fluorimetry, microfluorescence, CARS, and optogalvanic detection. A preliminary discussion of relevant laser properties is particularly helpful.

The lack of coverage of relatively recent developments in analytical laser spectroscopy is readily apparent in this volume; this drawback is probably unavoidable due to printing delays and rapid developments in the field. Therefore much of the "recent" data reported here should be considered in light of the current literature.

Anyone with a background in spectroscopy should find this volume useful. Persons with an interest in the applications of lasers to analytical spectroscopy will find it indispensable.

Robert B. Green, *University of Arkansas*

Flavonoids and Bioflavonoids, Current Research Trends. Proceedings of the Fifth Hungarian Bioflavonoid Symposium, Edited by L. FARKAS (Technical University, Budapest), M. GABOR (University of Medical Sciences, Szeged), and F. KALLAY (Research Institute for Organic Chemical Industry, Budapest). Elsevier, New York. 1977. xii + 472 pp. $69.95.

This latest in a series of apparently biennial Hungarian symposia on the title compounds consists of 43 papers, in English, originating mainly in Hungary and West Germany. The quality of writing is generally quite good, especially since the editors note that manuscripts were photographically reproduced after minimal correction. There appears to be little information that is not either available from journals or in press, and many of the references cited will be well known to workers in flavonoid chemistry. Most of the papers are very narrow in scope, although there are some useful tabulations of spectral data.

Most of the material is concerned with structure proof and synthesis. Approximately a third is devoted to the physiological effects of bioflavonoids; it is interesting to contrast these discussions with studies by American workers, many of whom consider bioflavonoids to have questionable nutritional value. It is perhaps this look at a different school of biochemistry that is the most interesting feature of the work to nonflavonoid chemists. In any case, the book should appeal to only a very select audience.

Keith T. Buck, *Fries and Fries Division, Mallinckrodt, Inc.*

Flavor of Foods and Beverages, Chemistry and Technology, Edited by G. CHARALAMBOUS (Anheuser Busch) and G. E. INGLETT (U.S. Department of Agriculture). Academic Press, New York. 1978. xiii + 422 pp. $26.00.

This collection of 25 papers presented in June 1978, in Athens, Greece, continues the series of publications emanating from events sponsored by the ACS Agricultural and Food Chemistry Division. Since the subject of trace flavor components is diverse and has ramifications in many other areas of chemistry, it is not surprising that the material in this work overlaps that of its predecessors only slightly. The extremely rapid growth in this field due to advances in instrumentation also contributes to the novelty of much of the work.

Most of the material deals with identification of odor components of specific foods (soy protein, bread, cheese, chocolate, confections, olive oil, orange juice, tea, beer, whiskey, wine), but a portion of the work is devoted to analytical techniques, natural and artificial sweeteners, the thermochemistry and formation of odorants, and mechanistic studies of olfaction and taste. The quality of the writing is generally good, and citation of references is extensive. A brief subject index is included. Most flavor chemists will probably want to add this work to their libraries.

Keith T. Buck, *Fries and Fries Division, Mallinckrodt, Inc.*

Advances in Physical Organic Chemistry, Volume 15, Edited by V. GOLD and D. BETHELL. Academic Press, New York. 1978. 352 pp. £16.40; $34.50.

This volume of a most distinguished series presents four reviews: J. Hine on the principle of least nuclear motion (PLNM); J. M. Thomas, S. E. Morsi, and J. P. Desvergne on topological phenomena in organic solid state chemistry; T. E. Hogen-Esch on ion-pairing effects in carbanion reactions; A Brändström on principles of phase transfer catalysis by quaternary ammonium salts. The first three chapters treat three aspects of a most important trend in chemical research, namely, the detailed evaluation of specific steric factors on reaction rates and equilibria. The fourth reports on the current status of quantitative aspects of phase-transfer catalysis. It provides valuable suggestions for those engaged in preparative chemistry with respect to ways of choosing solvents and catalysts for obtaining reactivity and selectivity. From the mechanistic viewpoint the chapter considers

extraction equilibria and rates and the identification of the reactive species (free ions, ion pairs, aggregates) in the organic phase.

Returning to the treatments of steric effects, restriction of motion of two molecules to suitable orientation of reaction centers can have a dramatic effect on reaction rates. Such restriction is, of course, a major factor in enzymatic catalysis. Crystals having appropriate molecular orientations are useful systems for probing the relationship between restrictive (and known) geometry and reactivity, and this field is reviewed by Thomas et al. Hine examines the behavior of more relaxed systems with emphasis on hydrogen-atom abstraction by methyl radicals and by ethyl radicals and on proton abstraction from such acids as nitroalkanes. According to the PLNM hypothesis, that reaction path is favored for which the geometry of the transition state has the smallest difference from the geometry of reactants. The idea is an interesting one but its utility has yet to be demonstrated. PLNM may turn out to be a poorly defined subset of the more general topic of steric effects on reaction rates, or it may develop into a useful qualitive or semiquantitative approach. Hine's review suggests several interesting lines of further investigation and examines critically the current status of PLNM.

The Hogen-Esch review, comprising about one-third of the volume, considers carbanion ion-pairing equilibria, rates, and stereochemistry. It provides a wealth of useful information for any reader willing to sort out the key information. Differences between contact ion pairs, solvent-separated pairs, and free ions arise from differences in the average geometries of these several species. The studies reviewed here illustrate well the progress being made in determining what are the specific interactions between molecules in solution, as opposed to more general models based on the dielectric constant or other bulk properties.

D. F. DeTar, *Florida State University*

The Chemistry of the Tetracycline Antibiotics (Medicinal Research Series, Volume 9). By LESTER A. MITSCHER (University of Kansas). Marcel Dekker, Inc., New York. 1978. xv + 330 pp. $34.50.

The author is eminently successful in his stated purpose of presenting a synopsis of the vast literature on the chemistry of this highly useful class of drug substances. The opening chapter traces the historical development of different tetracyclines, their chemical interrelationships, and the extent of their utilization in medicine. It also presents basic data on the clinical and nonclinical pharmacology and pharmaceutical aspects of tetracyclines. The following two chapters describe the fermentation, isolation, and biosynthesis of these compounds. There is a comprehensive chapter on the spectroscopy, assay methods, and chromatographic techniques for tetracyclines. The subsequent chapters deal in substantial detail with the fascinating subjects of structure elucidation, molecular modifications, and total synthesis. The book is an excellent introduction of the area with ample references for research work and enjoyable reading for an interested organic chemist.

O. P. Goel, *Warner-Lambert/Parke-Davis*

Polymer Fracture. By H. H. KAUSCH (Ecole Polytechnique Federale de Lausanne). Springer-Verlag, Berlin–Heidelberg–New York. 1978. x + 332 pp. DM 128-.

"Polymer Fracture" is Volume 2 in the series "Polymers/Properties and Applicatiions".

The central theme of the book is, according to its author, "the behavior of chain molecules under conditions of extreme mechanical excitation and the likely role of chain scission in the initiation and development of macroscopic fracture".

Starting from the discussion of the polymer structure as it related to deformation processes and reviewing existing fracture theories, the author discusses in two subsequent chapters thermomechanical excitation and scission of chain segments as they are compared with bond energies and strength of primary bonds in the chain. The following chapters deal with the identification of mechanically formed free radicals (ESR) and the kinetics and mechanisms of formation of free radicals by mechanical methods. In two concluding chapters the role of chain scission in homogeneous (when demage development is macroscopically homogeneously distributed) and heterogeneous (when demage starts from existing defects) deformation and fracture is discussed.

The book presents the basic concepts of polymer fracture in a clear manner, the style is easy to read, and a large number of figures and especially photographs provides a good illustration of discussed subjects.

The book should be part of every library which is concerned with polymer physics and polymer engineering, but the high price will prevent many scientists from having this otherwise excellent book as part of their personal library.

P. Kubisa, O. Vogl, *University of Massachusetts*

Internal Rotation and Inversion. By D. G. LISTER, J. N. MACDONALD, and N. L. OWEN (University College of North Wales). Academic Press, London. 1978. xii + 246 pp. £11.50.

The purpose of this book is to introduce the nonspecialist to the field of large-amplitude motions within molecules. The first chapter, "Molecules, Isomerism and Large Amplitude Vibrations" (20 pp), introduces basic terminology about molecular conformation as well as the concept of a potential energy function for a one-dimensional variable. The physical principles which allow various experimental techniques to probe the nature of molecular conformations are very briefly introduced. In Chapter 2, "Molecular Energy Levels" (64 pp), are discussed some of the considerations which enter into solving molecular Schrödinger equations (Born–Oppenheimer approximation, symmetry, matrix formulation). Large-amplitude vibrations are shown to be reasonably separable from other motions, and the solutions for some important one-dimensional periodic and nonperiodic potential functions are outlined. This chapter appears to be a very agreeable compromise between the needs of an unfamiliar reader and the demands of a difficult subject. Chapter 3, "Experimental Methods of Studying Large Amplitude Internal Motions in Molecules" (19 pp), lays out in more detail the physical bases underlying microwave, infrared, and Raman spectroscopies, and also gas-phase electron diffraction. The mathematical relationships inherent in actual use of these methods are deferred to later chapters. Chapter 4, "The Origin of Potential Barriers" (16 pp), outlines some of the theoretical work which has been done on this problem. This chapter is somewhat dated, and completely omits any treatment of the relations between conformational energies and phase relations between localized or delocalized MO's. Chapters 5 and 6 (67 pp) take up the details of internal rotation of symmetric and asymmetric groups, respectively. The mathematics and statistics involved in determining level splittings and line intensities are developed for high, intermediate, and low barrier cases. Principal and internal axis methods are taken up. In each chapter, a survey of selected representative examples is presented and briefly discussed in order to bring out both the regularities and the exceptions, with discussion of causes for the latter. Chapters 7, on "Inversion" (25 pp), and 8, on "Large Amplitude Vibration in Ring Compounds" (28 pp), treat these vibrations in similar spirit and format as the treatments of internal rotation. The final chapter, "Internal Rotation and Conformational Flexibility in Macromolecules" (14 pp), relates the structures of proteins, nucleic acids, and carbohydrates to the conformational considerations described in earlier chapters. This chapter is entirely qualitative.

Each chapter ends with a selected list of publications to guide the interested reader into the literature, and the book is generously illustrated with figures of molecular structures and potential energy profiles.

This book pulls together information which has been scattered through the literature, and presents it at a uniform and reasonably elementary level. It should prove a useful starting point for a neophyte who plans to do experimental work in the field.

John P. Lowe, *The Pennsylvania State University*

International Symposium on Macromolecules. Edited by C. G. OVERBERGER (University of Michigan) and H. MARK (Polytechnic Institute of New York). John Wiley & Sons, New York. 1978. v + 351 pp. $30.00.

This volume is No. 62 in the *Journal of Polymer Science: Polymer Symposia* series. It contains 19 of the 24 invited lectures presented at the International Symposium on Macromolecules, University College, Dublin. The four stated general themes (followed by number of articles in parentheses) are Homogeneous Polymerization by Anions, Zwitterions, and Coordination Complexes (4), Fine Structure of Polymers, including Biopolymers (5), Polymers as Reagents and Catalysts (6), and Polymer Chemistry in Polymer Engineering (4). Articles differ substantially in scope. Several, with titles such as "Electro- and Photoresponsive Polymers" and "Polymer Crystallinity and the Engineer", present a quick review of a broad field. Others, e.g., "Reactions of Polymers—Hydrophobic Factors", are essentially complete research papers which include experimental details. No subject index is provided. However, 17 of the 19 articles are well

documented, with the number of references ranging from 18 to 97. Several references are made to articles published as recently as 1977.

Wayne L. Mattice, *Louisiana State University*

Synthetic Detergents, Sixth Edition. By A. DAVIDSOHN and B. M. MILWIDSKY. John Wiley & Sons, New York. 1978. ix + 260 pp. $25.00.

The book provides some useful information to detergent chemists. It consists of eight chapters. Chapter 3 in the Fifth Edition has been divided into two chapters (3 and 4) in the present one.

The text begins with a chapter reviewing the development of the detergent industry. Different types of surfactants, namely, the cationics, the nonionics, the anionics, and the amphoterics, are discussed in the next chapter. Two pages of more recent anionic surfactants, such as phosphate esters, sulfosuccinates, etc., are added in the new edition.

Chapters 3, 4, and 6 are, in my opinion, most useful to the readers. The authors have made a fine presentation of builders. It is also more appropriate to separate the builders into inorganic and organic ones as in the new edition. Chapters 3 and 4 discuss the function of the builders, their advantages and disadvantages. My only comment is that with the development of phosphate substitutes, more recent studies on builders, such as Lever Brothers' sodium CMOS (sodium carbomethyloxysuccinate) and Monsanto's Builder M (a mixture of salts of polycarboxylic acid), should be mentioned or referred to. Sodium aluminosilicate (Zeolite), the latest development, also deserves more than a casual reference.

Methods of preparing powder, liquid, and paste detergents and factors to be considered in the manufacturing process are of great importance to practical detergent chemists. The authors have made a fine discussion in Chapter 6. The sections on fabric softeners and abrasive cleaners appear out of place in this chapter and may be better included elsewhere. Chapter 5 is devoted to the synthesis of different surfactants with major emphasis on sulfonation. The word sulfonation in the discussion applies to both sulfonation of phenols and sulfation of alcohols.

It may be better for a detergent chemist in the United States to refer to formulations in the product bulletins from different suppliers rather than to the formulations in Chapter 7. These formulations may be more useful in other countries. As an example, the amounts of phosphate in formulations 34, 35, and 36 are excessive. Less than half the amount is usually used in the U.S. formulations. Furthermore, tetrasodium pyrophosphate is not often used, being a poor chelating agent for Ca^{2+} ion. Sodium tripolyphosphate is more effective for Ca^{2+} ions and equally economical. The high-foaming nonionic detergents, such as nonylphenol-9 mole ethoxylate or the anionic detergents, are also not used in the U.S. dishwashing machines as they generate too much foam under the normal washing conditions. In commercial laundering, the amount of surfactant is too high in formulation 42 and, again, sodium tetrapolyphosphate is not used. Some other formulations are also of questionable application in the United States. The chapter also needs some updating to include nonphosphate formulations in different applications. Chapter 8 presents some analytical procedures to analyze detergents.

Compared with the Fifth Edition, there seem to be very few significant changes. Most of the modifications appear to be minor. There should also be more recent references added to reflect the development of detergents in the world, especially in the United States during the past ten years.

Joseph Niu, *BASF Wyandotte Corporation*

Topics in Antibiotic Chemistry, Volume 2, Antibiotics from Marine Organisms, Oligosaccharides, Anthracyclines and Their Biological Receptors. Edited by P. G. SAMMES (The City University, London). John Wiley & Sons, New York. 1978. 283 pp. $42.50.

This volume presents four reviews or surveys on the nature and mechanisms of action of antibiotics: "Antibiotics from Marine Organisms", by D. J. Faulkner; "Oligosaccharide Antibiotics", by A. K. Ganguly; and two complementary articles, "Daunomycin and Related Antibiotics", by F. Arcamone and "Interactions of Daunomycin and Related Antibiotics with Biological Receptors", by S. Neidle.

Half of the book is devoted to Arcamone's contribution, which is a review of the chemistry and pharmacology of the antracycline antibiotics. He condenses and puts in perspective the large amount of material published on these important anticancer agents. The article describes the interesting degradation and structure-determination studies of daunomycin. Several syntheses of daunomycinone, daunosamine, and the glycosidic bond are presented. Numerous phases of physico-chemical and analytical studies are given in detail. Structure–activity relationships are discussed as well as the effects of metabolism and microbial transformations.

Neidle's article is a discussion in depth of the interaction of daunomycin with DNA. This presentation of nucleic acid binding studies includes many graphs and tables. The organization of this information provides easy understanding of the mechanism of action at the molecular level. Daunomycin's ability to intercalate between base pairs is well described and demonstrated by means of drawings and pictures of space-filling models.

Faulkner's contribution is a survey of organic compounds from marine sources such as microorganisms, sponges, coelenterates, molluscs, worms, tunicates, and algae. A wide variety of compounds are presented and syntheses of some of these are included. Though most of the compounds discussed have only marginal antibiotic activity, the article is a good introduction to this expanding field of chemistry.

Ganguly's review is a "state of the art" description of the structural elucidation of the oligosaccharides. Because of the highly complex nature of these antibiotics, in terms of reactivity group interactions and the large number of asymmetric centers, what is known about their structure is told in an intriguing tale. Ganguly details the methods used in the determination of the structural fragments and the sequence in which they occur. The structure determination of Everninomycin comprises most of the article, although Flambamycin, Curamycin, and Avilamycin are also discussed.

John J. Pendery, *University of Michigan*

Liquids and Their Properties (A Molecular and Macroscopic Treatise with Applications). By H. N. V. TEMPERLEY and D. H. TREVENA. Wiley/Halsted, New York. 1978. 274 pp. $37.50.

This volume describes the modern understanding of the molecular and bulk properties of liquids, on a level suitable for an advanced undergraduate or beginning graduate student. The volume is truly outstanding, both for its clarity and for the remarkable range of topics covered. Major chapters treat intermolecular forces, statistical mechanics of the liquid state, phase changes, hydrodynamics, ultrasonic waves, responses of fluids to pressure and tension, surface effects, the radial distribution function, mixtures, transport processes, non-Newtonian fluids, and liquid helium. The theoretical chapters approach matters from a sound formal standpoint, without an excess of mathematical detail. Experimental results are given a phenomenological description, with microscopic ideas being used qualitatively but systematically, to explain physical effects. The authors only presuppose that readers have had a reasonably solid course in physical chemistry.

One of the strongest points of the volume is that it does not omit less conventional topics. Fluidized beds are mentioned as "liquid" systems. The chapter on liquid structure includes qualitative treatments both of computer applications (Monte Carlo and molecular dynamics) and of physical modeling techniques (suspended ball bearings). Non-Newtonian fluids showing dilatant behavior (shear thickening) and negative thixotropy share space with a characterization of more common sorts of non-Newtonian behavior. Except in the treatment of hydrodynamics and acoustics, the authors avoid detailed mathematical calculations. When calculations do appear, they are physically motivated and proceed from first principles through to conclusion. Particularly noteworthy are the derivations of the law of corresponding states and the semiclassical London dispersion energy (in one dimension, with quantization inserted at the end).

The authors do not discuss many modern spectroscopic techniques, molten metals, or polymer solutions; one must stop someplace. The chapter on transport processes is perhaps the weakest of the book. The authors treat in detail some of the early work of Kirkwood and Eisenschitz, rather than surveying modern results. A qualitative introduction to correlation functions, the Onsager regression hypothesis, or the relation between Brownian motion and fluctuation–dissipation theorems might have been of greater value, without overwhelming the chosen audience.

Despite these minor caveats, Temperley and Trevena have written a superb introduction to the physical chemistry of the liquid state, at a level suitable for a senior-year special topics course.

George D. J. Phillies, *University of Michigan*

Polymer Solution Properties, Part I; Statistics and Thermodynamics, Part II; Hydrodynamics and Light Scattering, Edited by J. J. HERMANS. Dowden, Hutchinson & Ross, Stroudsburg, Pa. 1978. Part I: xi + 235 pp. $25.00. Part II: xiii + 295 pp. $32.00.

These two volumes contain facsimile reproductions of some 46 classic papers on properties of polymers in solution, together with the editor's introductory notes on each section. The volumes were prepared as a historical introduction to their topics, with especial attention to the needs of a graduate student who must pass beyond the bounds of a conventional introductory text. As with any field this size, every important topic or paper has not been included; in particular, treatments of polyelectrolyte solutions and of experimental techniques other than light scattering have been omitted.

Organization of the volume is by topic, covering statistics of chain molecules (11 papers), thermodyanics (8 papers), hydrodynamics (18 papers), and light scattering (9 papers). A complete list of the papers included in the volume would be excessively long. Noting only the running titles of papers, the period covered extends from the early 1940s (M. L. Huggins, "Solutions of Long-Chain Compounds"; W. Kuhn and H. Kuhn, "Die Abhängigkeit der Viskositat") to the beginning of this decade (H. Yamakawa and M. Fujii, "Translational Friction Coefficient of Wormlike Chains"; or D. E. Nordhaus and J. B. Kinsinger, "Brillouin Spectroscopy of Macromolecular Solutions"). The value of the text is substantially enhanced by an author citation index as well as the more customary subject index. These volumes ought to be useful additions to the private library of an advanced graduate student or researcher entering the field of polymer solutions.

George D. J. Phillies, *University of Michigan*

Modern Molecular Photochemistry, By NICHOLAS J. TURRO (Columbia University). The Benjamin/Cummings Publishing Co., Inc. Menlo Park, Calif. 1978. xii + 625 pp. $23.95.

"Modern Molecular Photochemistry" departs brilliantly from the standard treatment offered by the many recent publications in this area. Turro's infectious enthusiasm coupled with a lucid writing style and an emphasis on pictorial representations of complex phenomena, including excellent discussions of potential energy surfaces and the use of state correlations, gives this book a truly unique flavor. The book is nicely printed with excellent diagrams, and is remarkably error free.

The first half of the book, through Chapter 9, covers spectroscopic basics including energy transfer and radiationless and radiative transitions. There are also sections on potential energy surfaces, states, and the construction and use of qualitative state correlations. Because the approach used permits ready geometric visualization, these chapters are suitable for the neophyte, but those more advanced in the science will also benefit from Turro's insightful perspective. A concise description of the common mechanistic tools utilized in organic photochemical research is given in Chapter 8 and the reactions themselves are emphasized in Chapters 10 through 13. Rather than attempting encyclopedic coverage, the mechanistic interpretation of reaction types (photoadditions and photosubstitutions, cycloadditions, isomerizations and rearrangements, and photofragmentations) is discussed with the aid of well-chosen examples from the literature. The coverage is very thorough with many references to recent research. These chapters make liberal use of the concepts introduced earlier. However, rather scant attention is paid to the use of photochemical methods in the synthesis of complex molecules.

The final chapter is devoted to singlet oxygen and chemiluminescence and, as expected, the discussion is very thorough. The inclusion of chapters on other timely subjects might be desired, but a book of this type must obviously remain a reasonable size.

For anyone with an interest in organic photochemistry, "Modern Molecular Photochemistry" will be a welcome and useful volume; in fact, it may well become de rigueur for the teaching of the subject.

David S. Weiss, Eastman Kodak Company

Modern Physics in Chemistry, Edited by E. FLUCK (Stuttgart) and V. I. GOLDANSKII (Moscow). Academic Press, New York. 1976. xiii + 406 pp. $36.10.

Following an International Conference on Mössbauer Spectroscopy held in September 1971 the editors decided to assemble a volume written by "leading experts from several countries on chemical applications of various methods of modern physics." Having received only eight of the seventeen promised contributions by the end of 1973, the editors decided to proceed with the material then in hand. Of the nine authors eight are from the Soviet Union, one from East Germany. How many of the dilatory contributors are from the West is not disclosed by the editors.

The eight chapters are on Chemical Effects in X Ray Spectroscopy (two chapters), Electron Paramagnetic Resonance Spectroscopy, Nuclear Quadrupole Resonance, Chemically Induced Nuclear Polarization, Mössbauer Double Resonance, Positronium in Chemistry, and Mesic Chemistry.

The writing is of uniformly high quality, lucid, and not at all stiff. The references are fair and extensive, not tainted by parochialism. An expert in a particular field may not find the chapter on his specialty particularly useful or valuable, but I believe all chemists will find novel and interesting material in the book.

Concerning the danger that chapters which were written six or seven years ago are now obsolete, and to give an example of the style of the book, I quote from Fedin's chapter on Nuclear Quadrupole Resonance: "Studies of the literature reveal that the flow of data in extensive fields of study is akin to Markovian. Within 10 years the work of preceding generations is almost forgotten and youth boldly attacks the already explored grounds. I will try to refer chiefly to earlier papers and cite new results only where absolutely necessary."

S. I. Weissman, *Washington University*

Cell Surface Carbohydrate Chemistry, Edited by R. E. HARMON (Western Michigan University). Academic Press, New York. 1978. xv + 359 pp. $19.50.

This volume provides the written record of the Cell Surface Carbohydrate Chemistry Symposium held on September 1 and 2, 1976, in conjunction with the American Chemical Society Centennial Meeting in San Francisco. The 17 research papers included suggest the breadth of experimentation occurring in this burgeoning field. Topics discussed range from the crystal structures of lectin carbohydrate complexes to composition studies of cell membrane glycosphingolipids and "footpads", the attachment surfaces which play a significant role in cellular adhesion. Several papers deal with the relationship between cell surface components and tumorigenicity. As a report of current research activities it suffers the usual problem of "lagtime" between presentation and publication. A second deficiency is the absence of the discussions and comments made after each paper. Nevertheless, the book is well edited and produced and should prove a useful addition to the biomedical-molecular biology collections of institutions or specialists in the field.

William T. Winter, *Polytechnic Institute of New York*

Elementary Principles of Chemical Processes, By R. M. FELDER and R. W. ROUSSEAU (North Carolina State University). John Wiley & Sons, New York. 1978. xiv + 571 pp. $19.95.

The choice of an appropriate textbook for an introductory course in chemical engineering has proved, for some years, to be a frustrating endeavour. For in departments graced by superior undergraduates who have had the benefit of an excellent freshman chemistry course, many of the available texts are too rich in redundancy; others while more sophisticated in content suffer a paucity of illustrative examples which are so necessary to inspire those students who grasp the conservation principle immediately and then seek its meaningful application.

This recent text of Felder and Rousseau is excellent, being largely devoid of redundancy and quite rich in illustrative exercises.

Following an introductory chapter citing "what chemical engineers sometimes do" (apparently they do not "sometimes" study graceful English!), a chapter is devoted to a terse presentation of units, dimensions, their conversion, etc. Process variables are then treated, followed by a precise treatment of data representation and analysis. Chapters 5 through 11 deal with the central issues of material and energy balances. Single and multiphase systems are embraced in these chapters as are energy balances on reactive processes. Transient nonreactive processes are addressed in Chapter 11. In the concluding chapter, three case studies are set forth in which principles and techniques elucidated in earlier chapters are cogently applied to formaldehyde production, stack gas SO_2 removal, and, finally, the Kraft pulping process.

A valuable section is appended which deals with elementary but essential computational techniques. Key tables and figures are well indexed, including diverse physical property data tabulations.

In addition to a large number of detailed examples and, as the au-

thors put it, "test yourself" queries, each chapter is appended with numerous problems reflecting the application of chemical engineering analysis to processes as diverse as coal combustion and artificial kidney dialysis.

The authors are to be saluted for their fashioning of a text which so intelligently treats issues essential to analysis of all physical-chemical processes.

James J. Carberry, *University of Notre Dame*

Modern Aspects of Electrochemistry, No. 12. Edited by J. O'M. BOCKRIS and B. E. CONWAY. Plenum Press, New York. 1977. xii + 325 pp. $32.50.

For 25 years, this series has presented detailed discussions of important topics in kinetics and thermodynamics of electrolyte solutions and of interfacial phenomena. These reviews reflect a strong editorial presence. The individual chapters have preserved a reference quality, much more like chapters from a "treatise" than articles from a "current topics" series. The book is easy to read because it is fully typeset, not reproduced in the trendy form of photo-offset from author's typescript.

Chapter 1 (T. Erdey-Grúz and S. Lengyel) discusses the mechanisms of proton transfer in solution that may explain the abnormally high conductance of protic (and hydroxylic) media. The topic was last reviewed in this series in 1964.

Chapter 2 (A. K. Covington and K. E. Newman) presents a thorough discussion of the use of NMR to study the structure of electrolyte solutions. Proton exchange mechanisms, solvent structure studies, and contact (paramagnetic) shift effects are competently reviewed. A substantial section on mixed solvents is particularly interesting reading. A complementary article on this topic appeared in Vol. 10 of this series.

Chapter 3 (M. A. Habib) summarizes a number of studies and theories of solvent dipole orientation at electrodes. It is particularly thorough in its presentation of the work of Bockris and co-workers over the past three decades.

Chapter 4 (K. Kinoshita and P. Stonehart) describes a special area of electrocatalysis, high surface-area or "highly-dispersed" materials. Familiar examples of these are carbon black, black platinum, and Raney nickel. Methods of preparation and characterization are discussed for those and a wealth of other metal and metal-oxide materials (Au, Ag, Ni, Rh, etc).

Chapter 5 (J. Farges and F. Gutmann) brings charge-transfer complexes into conjunction with electrochemistry. The references cited in this chapter provide easy entry to the literature of these fascinating and important electron-exchange processes.

Larry B. Anderson, *The Ohio State University*

General and Synthetic Methods, Volume 2. Senior Reporter: G. PATTENDEN. The Chemical Society, London. 1978. xi + 263 pp. $57.00.

This latest Specialist Periodical Report on general synthetic methods covers the period January to December, 1977, with the unfortunate exception of saturated heterocyclic ring synthesis which will be reviewed in the next volume. The subject matter is divided into chapters on acyclic hydrocarbons; aldehydes and ketones; carboxylic acids and derivatives; alcohols, halogeno compounds, and ethers; amines, nitriles, and other nitrogen-containing functional groups; organometallic chemistry; saturated carbocyclic ring synthesis; and strategy and design in synthesis. In addition, a short section (four pages) is provided which contains a list of pertinent reviews which appeared during 1977.

The lack of a subject index makes it difficult to locate information. This problem is inadequately remedied by the inclusion of a table of contents. For example, the table of contents reveals brief sections on sulfur (3 pp) and selenium (1 p) within the chapter on organometallic chemistry. Yet examination of individual chapters reveals the use of sulfur and selenium throughout the book.

The large amount of information presented in this book will be welcomed by both researchers and teachers alike. It should be pointed out, however, that many of the synthetic methods covered in this volume have appeared in the 1977 edition of Annual Reports (B), also published by the Chemical Society. If and when Annual Reports changes its present format, the acquisition of "General and Synthetic Methods" for groups engaged in synthetic organic chemistry will become a must.

Paul A. Grieco, *University of Pittsburgh*

Inorganic Reaction Mechanisms, Volume 5 (Specialist Periodical Reports). Senior Reporter: A. MCAULEY (University of Victoria, Canada). The Chemical Society, London. 1977. xviii + 454 pp. $58.00.

Volume 5 of this series, which is about 50 pages longer and a bit less expensive than Volume 4, covers the literature from January 1975 to June 1976. Continuity is provided volume to volume, by maintaining the same format and section titles. Thus, the book is composed of four main parts: Electron Transfer Processes (R. D. Cannon, A. G. Lappin, and A. McAuley, 114 pp), Substitution and Related Reactions (G. Stedman, J. Burgess, P. Moore, and D. N. Hague, 156 pp), Reactions of Biochemical Interest (D. N. Hague, 29 pp), and Organometallic Compounds (J. L. Davidson, 135 pp). A detailed table of contents makes up for the lack of a subject index.

According to the Foreword, the concentration is on papers in which kinetics and mechanisms in solution are of principal interest. The book is highly illustrated and contains many tables; these features are an aid in following the discussion since many papers are reviewed in only one or two sentences. Those people who are familiar with the previous volumes of this series will find Volume 5 at the same high level of presentation and coverage.

Michael F. Farona, *The University of Akron*

Structure and Bonding, Volume 34; Novel Aspects. Springer-Verlag, Berlin—Heidelberg—New York. 1978. 213 pp. $37.00.

This recent volume in the "Structure and Bonding" series contains five review articles on a variety of subjects. The measurement of complexing constants by radiochemical methods is described by S. Hubert, M. Hussonnois, and R. Guillaumont. Advantages and disadvantages of various experimental methods are discussed, and a study of the complexing constants of various lanthanide and actinide ions with citric acid is described. C. K. Jørgensen provides an interesting and entertaining review of the (postulated) chemistry of quarks. Even with the question of the existence of quarks put aside, the article is of interest as an exercise in the use of quantum mechanical principles in predicting chemical behavior. A brief introduction is devoted to the characteristics of quarks and their place among the elementary particles; however, the bulk of the review deals with the predicted reactions of quarks with various atoms and molecules. Chemical methods of capturing and concentrating quarks are discussed. The chemistry of the actinides in the biosphere is reviewed by R. A. Bulman, who provides a scholarly, readable account of a subject which should be of interest not only to chemists but also to the general public. With plutonium and other actinides being released into the biosphere, the possibilities of the entrance of actinides into food chain and actinide uptake via inhalation must be assessed. To do so requires bringing together diverse elements of actinide chemistry, soil science, the behavior of biological membranes, chemistry of various complexing agents, and the like. The reviewer considers many of the different routes by which actinides could enter the body, details relevant research, and attempts to give some idea of the feasibility of each proposed route. Electronic effects in transition metal porphyrins are discussed by J. W. Buchler, W. Kokisch, and P. D. Smith. Such effects help to govern the biological action of metalloporphyrins. Cis, trans, and metal effects are considered in terms of a set of simple electronic transmission schemes. The area of complexes of the lanthanides with neutral oxygen donor ligands is reviewed quite thoroughly by D. K. Koppikar, P. V. Sivapullaiah, L. Ramakrishnan, and S. Soundararajan. The complexes are classified, their coordination chemistry is discussed, and studies using various physical methods and the type of information which can be derived from these are summarized.

Susan Fitzwater, *Cornell University*

BOOKS IN GENERAL CHEMISTRY RECEIVED

Introduction to Modern Chemistry. By EUGENE MEYER (Lewis University). Prentice-Hall, Englewood Cliffs, N.J. 1979. xvi + 527 pp. $15.95.

Fundamentals of Chemistry. By FRED H. REDMORE (Highland Community College). Prentice-Hall, Englewood Cliffs, N.J. 1979. xix + 711 pp. $17.95.

Chemistry. By EDWARD L. KING (University of Colorado, Boulder). Painter Hopkins Publishers, Sausalito Calif. 1979. xx + 1101 pp. $19.95.

A book intended "for serious students of chemistry" and to be "a reference work for practicing chemists and biochemists".