# Computer Software Reviews

**MacSpartan**. Wavefunction, Inc., 18401 Von Karman, Suite 370, Irvine, CA 92612. Phone: (714) 660-6101, E-mail: macsales@wavefun.com, http://www.wavefun.com. Pricing: academic $299, government $599, commercial $899

MacSpartan is an implementation of the UNIX-based SPARTAN on the Machintosh platform. A Power Computing Power Tower Pro 225 with 144 Mbyte of RAM and 1 Mbyte of level to cache was used for evaluating MacSpartan (minimum requirement: MacOS computer having a PowerPC processor running System 7.5 or later, at least 16 Mbyte of RAM, and a CD-ROM). MacSpartan is protected by a hardware "key" that must be plugged into the ADB (Apple Desktop Bus).

MacSpartan supports five separate calculation routines: molecular mechanics using the SYBYL force field, the AM1 and AM1-SM2 semiempirical models, and Hartree−Fock ab initio calculations using the 3-21G (and 3-21G*) and 6-31G* basis sets. Ab initio calculations are restricted to molecules with less than 50 total atoms.

The graphical interface of MacSpartan is decidedly un-mac like, yet easy to learn and use. Molecules are generated with a "builder" interface. Although easy to use, this reviewer prefers the building routines of such programs as Chem 3D Pro. Fortunately, MacSpartan reads in data stored in the SYBYL mol format, one of the output options of Chem 3D Pro. There are a number of display options, including wire and ball, tube and ball, and space filling. There is no method for customizing any of these displays (for example, changing the size of atoms in the wire and ball mode). A number of molecules can be displayed simultaneously, although each is treated as a separate, independent structure and file. The default mode of interaction with a structure is mouse-driven rotation about the *x* (vertical motion) and *y* (horizontal motion) axes. A combination of these results is rotation about the *z* axis, a technique that becomes innate with practice. Rotation was fully real time on the system used for evaluation. There are a number of display options that can only be accessed by a combination of keys plus the mouse button. These include: X/Y translate, Z rotate, both of which can be applied either to a selected molecule or globally to all molecules, as well as a scaling. The background color and the color of individual atom types are fully controllable from a set colors menu (accessed from the open apple), and the clipboard resolution can be adjusted in four steps from the preference menu, with a maximum resolution of 288 dpi.

Once a molecule is created, a computational method is selected from the setup menu and then separately submitted as a job. Options (depending upon the computational method selected) include single-point energy, geometry optimization, transition structure, and frequency. A number of calculations can be stacked, each executing in turn, a particular convenience for the ab initio routines which are inherently quite time intensive. Once submitted, a monitor window opens showing the status of each submitted job. The output of each calculation is available in a text window, providing data that vary with the calculation method used. MacSpartan will execute in the background, and the degree to which it "hogs" the CPU can be controlled from the "Set Job Speed" option from the Actions menu of the monitor.

In addition to standard molecular displays, MacSpartan can show a variety of potential surfaces, including molecular orbitals and electron density plots. These can be displayed individually or in combination.

The MacSpartan User's Guide and Tutorial is exceptionally well done. The tutorial takes the beginner who may have never used a molecular calculation program through each of the operations available. The discussion of limitations of the various methods is very well balanced, and should be required reading for anyone using *any* mechanics and/or ab initio routine.

Overall, MacSpartan performed as advertised and provides access to sophisticated mechanics and ab initio calculations at a reasonable program cost.

**James K. Whitesell,** *University of Texas*

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# Book Reviews

**Combinatorial Chemistry. Synthesis and Application**. By Stephen R. Wilson (New York University) and Anthony W. Czarnik (IRORI Quantum Microchemistry). Wiley: New York. 1997. ix + 269 pp. $69.95 ISBN 0-471-12687-X.

In my opinion, combinatorial chemistry is the most exciting methodological development that has occurred in medicinal chemistry for several decades. This field at its best illustrates many characteristics that make science exciting: imagination, rapid evolution of ideas, and a sense of purpose. Some leading chemists are skeptical, however. It is easy for them to point to instances wherein rigorous and balanced scientific thought has mattered less than arguments designed for commercial success or survival. Consequently, I was concerned that the text I was about to receive might describe memorable science mixed with, and tainted by, thinly disguised sales information.

In the event, I was pleasantly surprised by this book. Overall, this is probably a text that everyone working in the area should buy and an essential component for any well-stocked library. It is not a graduate course book though. Being a collection of chapters by different authors from around the world, the book cannot present the seamless flow of ideas that students need.

Stephen Wilson's opening chapter is an excellent summary of the events that made combinatorial chemistry what it is today, and it is well referenced. He does not attempt to define what combinatorial chemistry is, though perhaps this is wise because there does not seem to be a definition that most researchers can agree on. Equally good contributions are given from some leaders in the field, without which a book of this kind would be incomplete. For instance, Wolfgang Rapp presents a section that focuses on his resins, Rebek and co-workers overview their deconvolution strategy, and there is inevitably a chapter from the prolific Houghten group. Bob Armstrong's chapter on multicomponent couplings contains a no-frills treatment of solid science that illustrates the impact that a world class synthetic organic chemist can have in this area. There is also a chapter on libraries of oligosaccharides by Carol Taylor (University of Auckland) that gives a balanced impression; her writing does not focus on the work of one group. Similarly, the chapter from Irving Sucholeiki (Sphinx) gives a nice feel for approaches to solid phase syntheses. A few of the other chapters may be too detailed or focused on a single commercial product for the average reader. The final contribution on biological systems is a conciliatory gesture toward molecular biologists who might justifiably argue that the title of this book should more accurately reflect its bias toward organic chemistry.

Inevitably, comparisons will be made with Günther Jung's collection *Combinatorial and Nonpeptide Libraries* which appeared in 1996 (VCH, ISBN 3-527-29380-9). It is hard to decide which is the better book, primarily because different readers seek different information. The Wilson/Czarnik text is more up-to-date, and perhaps has more emphasis on small molecule libraries. Jung's handbook is more comprehensive (heavier) and, despite its title, stresses peptide-related aspects more. It also has a chapter from Jon Ellman, but one which could not include his superb recent work on privileged structures for medicinal chemistry that are not benzodiazapines. Neither book contains contributions from Clark Still and the Pharmacopeia group, though their ingenious tagging method is outlined.

Combinatorial chemistry is here to stay. Wilson and Czarnik have put together a good collection from this initial exciting phase of research in the area. Together with Jung's text, this book has set a standard; to

make an impact, subsequent books on combinatorial chemistry will have to be more specialized and detailed than these.

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JA975554P

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**Guidebook on Molecular Modeling in Drug Design**. Edited by N. Claude Cohen (Ciba-Geigy, Ltd.). Academic Press: San Diego. 1996. xix + 361 pp. $59.95. ISBN 0-12-178245-X.

This book presents a survey of many of the computer techniques used in drug design. It also provides a useful discussion of X-ray crystallography and nuclear magnetic resonance.

The book is intended to be a guide for advanced students and chemists who are entering the field of computer-assisted molecular design, either as practitioners or as collaborators. Emphasis is on the design of potent ligands using the 3D structure of the target biomolecule. Chapters include a 17 page perspective by N. C. Cohen, a 36 page discussion of the hardware and software for molecular modeling by R. E. Hubbard, a 39 page introduction to molecular modeling of small molecules by T. Gund, a 45 page discussion of molecular docking and computer de novo design of new molecules by A. Itai, M. Mizutani, Y. Nishibata, and N. Tomioka, a 79 page review of the techniques of X-ray crystallography and NMR, structure databases, and searching of 3D information by J. P. Priestle and C. G. Paris, a 17 page discussion of management views and issues in incorporating computer techniques into industrial programs by P. Gund, G. Maggiora, and J. P. Snyder, and a 102 page review of techniques for modeling drug−receptor interactions and examples of the use of modeling techniques in lead optimization by K. F. Koehler, S. N. Rao, and J. P. Snyder. The extensive index and 19 page glossary (compiled by J. P. Tollenaere) of terms used in molecular modeling enhance the usefulness of the book for self-study. As might be expected, many of the chapters are summaries that suggest additional reading, although most references are from 1995 or earlier. Although it is a guidebook in molecular modeling, its impact is lessened by the lack of color figures. Readers can judge for themselves if these negative features lessen the utility of the book for self-study.

The book is unusual in that most of the authors work in industry rather than academia. They represent experience in U.S. companies (Merck, MSI, Pharmacia-Upjohn, and Searle) and European companies (Ciba-Geigy, Janssen Pharmaceutica, and IRBM), as well as academic research in the U.S. (NJ Institute of Technology and Emory University), U.K. (York University), and Japan (The University of Tokyo). The authors are all acknowledged experts in their fields and provide insights helpful to those not already involved in the field.

The title, *Guidebook on Molecular Modeling in Drug Design*, is misleading because it barely mentions a major effort in the field, namely, QSAR and 3D-QSAR. Although more than 500 CoMFA analyses have been published, only seven sentences are devoted to this topic! Reference is made to some of the other 3D-QSAR methods, but neither they nor traditional QSAR is discussed in any detail. On the other hand, both the chapter by T. Gund and that by Koehler et al. discuss in some detail the techniques of pharmacophore mapping and computer-assisted drug design in the absence of the 3D structure of the target biomolecule.

Overall, this is a book that is well suited for study by students or newcomers. The index and glossary make it handy for reference. It probably is too superficial to be useful to experienced practitioners.

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**Carbohyrate Analysis: High Performance Liquid Chromatography and Capillary Electrophoresis**. Edited by Ziad El Rassi (Oklahoma State University). Elsevier: Amsterdam. 1995. xix + 668 pp. $242.75. ISBN 0-444-89981-2.

The increasing recognition of the myriad of diverse roles played by carbohydrates in biological systems has resulted in a substantial demand for rapid efficient techniques for their separation. The analysis of these water-soluble uncharged species that typically lack observable chromophores or flurophores has traditionally made chromatographic analysis of underivatized samples a daunting task. Further complicating matters is the issue of glycoconjugates: frequently carbohydrates of biomedical interest exist not as free saccharides but rather as glycoproteins or glycolipids. Separation of these species was more accurately described as an art form than a science, and removal of the aglycon was frequently required for manageable analysis.

*Carbohydrate Analysis* carefully puts the past 20 years of methodological developments in HPLC and capillary electrophoretic separations into perspective in a single volume readily accessible to both novice and expert alike. The work, volume 58 in the Journal of Chromatography Library series, covers a variety of preparative and analytical separations of virtually every class of carbohydrate, including mono-, oligo- and polysaccharides, glycolipids, and glycoproteins, each from a variety of natural sources. The volume is broadly divided into three sections, covering sample preparation, chromatographic separation, and solute detection. Together the 17 chapters, representing contributions from 13 laboratories, provide all of the protocols required to design a separation for virtually any carbohydrate from any biological matrix.

Section I, covering sample preparation, provides methodology for isolating carbohydrate fractions from complex mixtures, cleavage of carbohydrates from glycoproteins and glycolipids, and both chemical and enzymatic digestion of complex samples into manageable fragments. The section provides detail on such methods at the level of solvent buffer compositions and commercial suppliers of reference compounds; extensive citations provide the reader with additional detail when required. Section II, detailing chromatographic separation of carbohydrates, covers a variety of methodologies from the traditional—reverse phase, silica, ion exchange, and size exclusion matrices—to specialized techniques more applicable to specific research applications, including lectin affinity chromatography. The level of detail in the eight chapters that comprise this section varies, but in general both the theoretical aspects of separation and practical aspects of carrying out procedures are covered. A chapter specifically devoted to preparative scale HPLC of carbohydrate derivatives will be of interest to a wide range of users, including synthetic chemists. The final section of the volume—detection of analytes—again covers techniques that the nonspecialist will likely have access to and those that will be of interest primarily to researchers involved in frequent laborious separations. Detection of underivatized carbohydrates by refractive index, mass spectroscopy, light scattering, electrochemical techniques, and polarimetry are covered thoroughly. Again, although the level of detail varies from chapter to chapter, both theoretical aspects of the technique and practical details required to actually effect detection are covered. Finally, detection techniques utilizing both chemical and enzymatic postcolumn modification are reviewed.

*Carbohydrate Analysis* has a copyright date of 1995, and the bulk of the references were published in the first three years of this decade. Most of the data and techniques presented here however are both fundamental and timeless. The volume provides a large amount of readily accessible practical information on chromatographic separations that will augment the collections of a wide range of chemists and biochemists with interests in carbohydrate chemistry.

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JA955106M

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**Online Searching: A Scientist's Perspective. A Guide for the Chemical and Life Sciences**. By Damon D. Ridley (University of Sydney). John Wiley & Sons, Inc.: New York, 1996. xx + 344 pp. $39.95 paperback. ISBN 0-471-96521-9.

This book fills the need of the literature retriever who would like an overview of STN (the online service that allows access to *Chemical Abstracts* and other chemical information databases). The author is well-qualified, having taught workshops and lectured on STN about 300 times in Australia and elsewhere. The author acknowledges, among others, Fred Winer (Chemical Abstracts Service, Columbus, OH), who may be more familiar to American audiences of the STN workshops.

The author effectively uses a pedagogical arrangement of each chapter, whereby he tells the reader what he will explain, he then explains it with explicit examples, and finally concludes with a summary of some key points of what has been explained. The book gives an

overview of the organization of several of the commonly used databases (files) among the 200 to which STN sells access. The reader will learn many of the sometimes cumbersome intricacies of designing text and structure search queries that will yield the most useful information. Pitfalls are pointed out. An outline of the book is available at http://www.chem.usyd.edu.au/~dridley/tocframe.html. The book has a pleasing paucity of misprints.

Although the individual scientist can clearly benefit from reading this textbook, the book's audience includes librarians. Essential concepts of chemistry are introduced assuming no prior knowledge. The author does an excellent job of teaching in one chapter the essence of (mainly organic) chemical structure conventions. On the other hand, some terminology of the CAS chemical information specialist, such as "bound phrases", "controlled term field", etc., are used with little or no attempt to explain what they mean. Unfortunately, the subject index is only 10 pages long and is rather incomplete, so it would be impractical to use this information-packed book as a quick reference. Much important material is listed in tables, but this information cannot be quickly refound because it is not indexed. A glossary of all the terms and acronyms encountered when using STN is sorely lacking.

One of the critical issues whenever using STN is to design the searches so as to maximize the relevance of the information retrieved while minimizing the cost of the searches. The author brings up this issue as early as page 20, but the introduction to the cost structure of STN is relegated to pages 163−166. The book claims it will help the user of other chemical information database providers, such as Knight Ridder (formerly Dialog) and Orbit/Questel. However, the two pages of appendix material devoted to some of the commands of the other systems are hardly adequate. Beilstein's online Crossfire system is not mentioned, and CAS's SciFinder is heralded briefly. Covering these other systems would have made the book too long. Most chemists probably will have their needs satisfied with STN. For STN structure searching, the author assumes the reader will have STN Express running on their PCs and Macs. Users having access to STN through other machines will have to follow the author's advice to obtain the relevant manuals from STN. The value of having STN reference books is brought up at several points in the book, but the postal, telephone, fax, and e-mail addresses of STN in Australia, the United States, or elsewhere are not given.

Librarians will certainly want to have this book on their shelves for themselves as well as their clients. The book will come in handy for librarians to loan to graduate students (or professors) when they come to the library asking for help on how to get started with the modern approach to literature searching. The book is no substitute for attending STN workshops but is highly recommended to the individual who is about attend a workshop.

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**Phthalocyanines: Properties and Applications, Volume 4**. Edited by C. C. Leznoff and A. B. P. Lever (York University, Canada). VCH: New York, 1996. vi + 524 pp. $150.00. ISBN 1-56081-916-2.

The first thing that caught my eyes was the appropriate choice for the color of the book cover, i.e. about the same blue as on my lab coat and equipment after working with phthalocyanines. This book is the fourth of a series started in 1989. It deals with the preparation, characterization, properties, and applications of phthalocyanines. Chapters are written by different authors from various parts of the world. The topics presented cover a wide range of substituted species and applications. The breadth of aspects regarding phthalocyanines makes this book a worthwhile addition to any science library, and more particularly to anyone with an interest on phthalocyanines. Chapter length varies considerably, from 18 pages for Chapter 1 to 102 for Chapter 3. The quality of the print and of the figures is pretty uniform and makes the book enjoyable to read. Most of the references are recent, up to 1995 for most chapters, which makes the book well up to date.

The stated purpose of the book is to discuss the properties and applications of phthalocyanines. These objectives seem to have been reached. Different chapters deal with chemical properties, for example, synthesis and chromatographic separation, acid−base and coordination, encapsulation in zeolites, molecular orbitals and electronic spectra, and single-atom bridge dimers. Others are concerned with physical properties, such as nonlinear optical properties and epitaxial growth of ultrathin films. A variety of applications are presented, including the use of the nonlinear optical (NLO) properties of metallophthalocyanines (MPcs) in photonics, their use in the fabrication of organic photovoltaic junctions, and the use of phthalocyanines and their derivatives for catalyzing various types of reactions. Examples of use in catalysis include hydrocarbon activation, chemical fixation and photoreduction of carbon dioxide, and metal−oxo chemistry as mimic of the P-450 enzyme. The application of molecular beam epitaxy for the epitaxial growth of ultrathin films of phthalocyanines is also described. Good electrical conduction properties have been obtained by appropriate stacking to give low-dimensional solids with special charge transport properties along the chain. Biomedical and biological applications are also found in the book, which describes medical imaging and therapy using radiolabeled phthalocyanines, the use of hemoproteins reconstitued with phthalocyanines for studying the biological functions of the proteins, and developments in photobiology for their tumoridicidal effects, ophthalmic photodynamic applications, antihyperplasia activity, inactivation of viral pathogens, antibiotic and antifungal effects, and use as photodynamic sensitizers for treating highly pigmented lesions.

In Chapter 1, the synthesis of new unsymmetrically substituted phthalocyanines includes the Diels−Alder reaction with [60]fullerene to give unsymmetrical enophilic phthalocyanines. Chromatography is used to separate tetrasubstituted and unsymmetrically sustituted phthalocyanines. The acid−base properties of azaporphyrins is presented in Chapter 2. This includes acid ionization, the methods used for estimating quantitatively the acidity or basicity, and the influence of acid−base properties on aromaticity, addition reactions, complexation reactivity, and protonation. Metal-free azaporphyrins and a theoretical approach are also given. In the very long Chapter 3, the NLO properties of MPcs are presented, including their second-order and third-order NLO, and ultrafast optical nonlinearities properties in relation to molecular symmetry and crystal symmetry, second-harmonic generation (SHG) and degenerate four-wave mixing (DFWM) for measuring the optical nonlinearities. The short Chapter 4 discusses the use of phthalocyanines for the catalytic oxidation of hydrocarbons, thiols, phenols, and indoles and for the homolytic activation of hydrocarbons. Chapter 5 describes briefly the chemical fixation and photoreduction of carbon dioxide catalyzed by phthlocyanine derivatives. Chapter 6 explains the fabrication of thin films of molecular organic semiconductors, their characterization, and their use in Schottky cells, n/p-junction cells, and photoelectrochemical cells. Chapter 7 discusses another very interesting application in catalysis: the encapsulation of metallophthalocyanines in the pores of zeolites, without chemical bonding ("ship-in-a-bottle complexes"), prevents aggregation of the catalyst in solution, or its deactivation by dimerization, and results in highly selective (including cis/trans stereospecificity) enhanced reactions. Chapter 8 discusses the epitaxial growth of ultrathin films of phthalocyanines by Organic Molecular Beam Epitaxy and compares the results to inorganic films grown by the same method, in terms of substrate/film lattice mismatch and of weak intermolecular interactions, and their implications on the strain in the films and their elastic constants. Chapter 9 is much more theoretical and provides an in-depth presentation of molecular orbital calculations and electronic spectra of phthalocyanines analogues, including deprotonated and metal-free tetraazaporphyrins and species containing carbon and/or nitrogen at the meso positions. The Symmetry-Adapted Perturbation Method in evaluating symmetry-lowering effects are also used. Chapter 10 gives recent results on metal phthalocyanine single-atom bridged dimers, with stacking properties leading to unidimensional electrical conduction and possible use as precursors for the formation of lineraly elongated aggregates with interesting charge transfer properties. Characterization includes also X-ray crystal structures and Mössbauer spectroscopy. Chapters 11, 12, and 13 describe biological and biomedical applications. Labeling metallophthlocyanines with radioisotopes provides novel diagnostic and therapeutic agents in nuclear medicine and biology, particularly for cancers. The chemical modification of heme in proteins by removing the native prosthetic group and coupling the resultant apoprotein with artificial hemins, including phthalocyanines, provides an elegant method for investigating the molecular mechanism of the function. The preferential binding of some dyes to tumor, viruses, bacteria, fungi, and parasites cause their accumulation. Then, using their photosensi-

tizing properties on excitation by visible light destroys these biological contaminants and leads to the technique called photodynamic therapy.

The book provides a good balance of preparation methods, characterization, theoretical studies, and applications, in agreement with its objectives stated in the title ("properties and applications"). It will be a very valuable resource to every scientist involved in the basic science of phthalocyanines and/or in their applications. It is also a good book for any scientist who desires to learn about the amazing breadth of science and technology covered by these versatile materials.

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**Chemistry under Extreme or Non-Classical Conditions**. Edited by Rudi van Eldik and Colin D. Hubbard (University of Erlangen-Nürnberg). John Wiley: New York. 1997. xii + 555. $99.00. ISBN 0-471-16561-1.

This book is an attempt to provide an update of chemistry performed under very unusual reactions conditions. It consists of 12 chapters by experts in their various fields. The book is actually a result of a recent European Cooperation in the Field of Scientific and Technical Research held in Lahnstein in 1995. As a result, the chapters all have references inclusive of 1995. Because of the nature of the workshop, all of the authors are European. This in no way detracts from the scope or coverage of the work, however, as all the authors seem to make every effort to be comprehensive with their defined boundaries. The book is actually one of a number of books on chemistry under extreme conditions by one of the editors (R.v.E.), and his experienced hand is evident throughout the work. It is clear the editors insisted each author provide a careful introduction to the techniques required in their respective fields. This is particularly important in such technology-driven research areas. As a result, the book is an excellent introduction for workers who are considering entering one of the areas featured in the book.

The first chapter, Chemical Synthesis using High Temperature Species, focuses on the metal atom vapor synthesis pioneered some years ago by Skell and Timms. There is an historical perspective and considerable detail devoted to technique. Much of the emphasis is on synthesis of molecular organometallic compounds, but some recent work on nanoparticles is also included. Chapter 2 is entitled Effects of Pressure on Inorganic Reactions and is written by the editors of the volume. This chapter reflects their extensive experience in investigation of the physical ramifications of high pressure on the mechanisms of inorganic reactions. Again, detailed descriptions of experimental techniques are much in evidence. The next two chapters, Effect of Pressure on Inorganic Reactions and Organic Synthesis under High Pressure, are somewhat redundant. However, the first focuses more heavily on the thermodynamic aspects of reactions at high pressure and provides considerable coverage of cycloaddition reactions such as Diels−Alder reaction, while the following chapter provides more expanded coverage of other important preparative reactions at high pressure, such as hydroboration and macrocyclic ring synthesis.

The next three chapters provide an excellent introduction to descriptive chemistry in supercritical fluids. The chapter entitled Inorganic and Related Chemical Reactions in Supercritical Fluids is an outstanding introduction to the nuances of using various supercritical fluids in preparative inorganic chemistry. A number of new techniques are highlighted, such as rapid expansion of supercritical solutions as an alternative to CVD, and NMR of high pressure fluids. The following chapter, Organic Chemistry in Supercritical Fluids, provides the organic counterpoint to the previous chapter. Again, the authors take care to cover a breadth of nonclassical areas such electrochemical synthesis and enzymatic reactions in supercritical fluids. The third chapter in this section, Industrial and Environmental Applications of Supercritical Fluids, highlights the rapidly expanding area of industrial use of high-pressure fluids. The chapter is divided into two parts, industrial processing and environmental remediation. The chapter is significant because this technology will begin to assume enormous importance in the coming years as workers begin to get more comfortable with the technology, and the authors do a good job of summarizing the field to date.

The focus of the next three chapters is on ultrasound and chemical reactivity. The first chapter of this section, Ultrasound as New Tool for Synthetic Chemists, provides an excellent summary of a fascinating and somewhat under appreciated field. The authors provide a very readable introduction for chemists not familiar with the topic (like this reviewer), followed by extensive coverage of the descriptive chemistry made available by this technique. The following two chapters, Applications of High Intensity Ultrasound in Polymer Chemistry and Chemistry under Extreme Conditions in Water Electrohydraulic Cavitation and Pulsed-Plasma Discharges, are more specialized, technical descriptions of specific aspects of the field. Nevertheless, the casual reader can get considerable feeling for the particular subject. There follows a chapter on microwave heating as a synthetic tool. Again, the author takes great pains to introduce the field and provides very illustrative descriptions of the techniques required. The focus is on inorganic rather than organic reactions. The final chapter, Biomolecules Under Extreme Conditions, is a shorter chapter which really focuses on polypeptides rather than actual living cells. Most of the emphasis is on the reactivity and stability of such polypeptides under high pressure. There is not much mention made of the various extremophilic bacteria, which are rapidly gaining attention.

The experienced editorship is clearly apparent throughout this book. All of the chapters contain clear introductions to readers who may be new to the field, followed by broad based coverage of the particular field. It appears that the reference area is reasonably complete and up to date. The end result is a series of highly readable chapters on a variety of fields which may be new to a number of chemists. To those more expert in the field, they provide an excellent summary of the work up to 1995. It should serve as an excellent inspiration for research proposals and seminar titles for graduate students and those new to the field. The book is well produced, with clear figures, ample references, and few typos. The editors' claim to try to pique the interest and curiosity of a broad range of students and chemists should be fulfilled by this interesting work.

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**Resins for Coatings: Chemistry, Properties Applications**. Edited by Dieter Stoye and Werner Freitag. Hanser-Gardner: Cincinnati. 1996. xvii + 458 pp. $169.50. ISBN 1-56990-209-7.

The first addition of this book was written in 1971, and this work is an updated version of the earlier work. This book is described by the authors as a "textbook" but does not appear suitable for either a graduate class or a special topics short course. Although many of the chapters are written in a textbook style, there are no problems or examples given. The subtitle contains the additional words "Chemistry, Properties and Applications". While the book does an adequate job describing the chemistry of the resin systems, it contains very few practical applications or properties of films. The book has many shortcomings; for example, the five chapters which are devoted to the principles of resin chemistry are contained in 45 pages. Each of the chapters on resin chemistry is written by a different set of authors, but in general the references cited by the various authors are old: for example, the chapter on polycondensates contains 120 references, but only 2 are later than 1990. Chapter 3, Basic Properties, is a 20 page discussion on the elementary physical chemistry of polymers. It contains little or no information specifically related to the physics or chemistry of polymer films. Furthermore, only 3 of the 44 references cited are later than 1980!

Two very important areas of concern for the resin chemist are solventless castings and surface preparation, neither of which is described in detail; i.e., no chapters or major sections of the book are devoted to either subject. Although some of the chapters contain the general structure or formulation of commercially available resins, they are not listed in the index or in an appendix; unless one knows the basic structure of the commercial material, it cannot be found.

The general chemistry of the various classes of resins used for coatings are discussed. However, none of the specific compounds mentioned in the book contains the chemical abstract registry number, an invaluable aid for a literature search.

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