

enough "play" to accommodate half-inch thick originals, and can be removed for larger bound books. Success in scanning large library-type bound volumes varies as with photocopiers (anyone who has tried copying from thick journal volumes with impossibly narrow margins will get the idea).

These powerful tools are not without some disadvantages. The OneScanner does not have an automatic feeder, which can make swapping of originals somewhat tiresome. As described above, the process currently involves three distinct steps; Caere has recently announced the upcoming release of OmniPage Direct for the Macintosh, which will convert images and automatically save text in a pre-selected word processing format in a single step. Significant memory is needed to operate this software, even at the most basic level—Ofoto (2.5 MB) and OmniPage Pro (4.5 MB) together require 7 MB of RAM, and more RAM is needed to run the word processing software at the same time (although that is not necessary; all scanning can be done first, and final conversion performed later). Also, hard disk memory is quickly gobbled up by even simple images, requiring frequent file weeding if storage space is at a premium. In short, if you have a very basic Mac setup, an upgrade will be necessary, and the OCR software (typically \$600–\$1000) is an added expense.

For those who can afford the investment, however, the ease with which pre-prepared charts, schemes, photographs, and clip art (otherwise unobtainable in electronic format) can be used to improve the look of even the simplest of documents makes the OneScanner quite attractive. Its advantages will be all the more obvious to the "two-fingered typist" who must repeatedly "pull together" and revise text from printed sources. It is, simply, a tool which will increase in value as the chemist becomes the desktop publisher.

Mark Volmer and Albert Padwa, *Emory University*

HMO. Version 2.0. Trinity Software: P.O. Box 960, Campton, NH. List price \$95.00; site license for up to 10 copies on a network server \$295.00; site license for up to 30 copies on a network server \$495.00.

HMO is a Huckel molecular orbital program with a graphical front end. It is compatible with both MS-DOS machines and Apple Macintoshes. Under both operating systems, the memory and disk space requirements for running HMO are minimal.

The software was tested on the Macintosh SE with 1 MB of memory, as well as on a Macintosh IIcx with 8 MB of memory. A non-post-script laser printer was used as the output device. System installation was straightforward and clearly explained in the accompanying manual. Only 200K of disk space were required, and the program could be run equally well from the floppy drive and the hard drive. Molecule building was easily accomplished by following the examples given in the manual or by editing one of the large number of sample structures included with the program. Several options for displaying the results are provided, and these, along with the graphical interface, are the major strength of the program. The molecular structure is displayed and indexed for every output type. All references to properties are related to the indices,

making interpretation of the results simple and unambiguous. A reasonably broad range of heteroatoms (B, N, O, S, F, Cl, Br) is supported. Two sets of atom parameters are included in the code (Streitwieser's set¹ and zeroth order parameters). Atom and bond parameters can both be modified by the user. Again, the documentation of this point is clear and easy to follow.

The principal disadvantage of the current implementation of HMO is that there are not cut and paste features. It would be useful to be able to copy diagrams and tables out of the output and paste them into other documents. Another feature that would extend the utility of HMO on either the Macintosh or the MS-DOS platform would be the addition of the extended Huckel (EHT) algorithm to the program. The current version supports only π -electron calculations. Programs which incorporate EHT algorithms are available for the Macintosh and the IBM from the Quantum Chemistry Program Exchange² at a price comparable to the HMO system, but typically do not have the nice graphical front end.

The MS-DOS version was tested on a Toshiba laptop with 512K of memory, an optical mouse, and graphics capability. A Microsoft compatible mouse and a graphics card and monitor are required to run HMO. The program had much the same feel under MS-DOS as it had on the Macintoshes. The documentation is concise, but clear.

This program would be most useful for research groups that are looking for something slightly more sophisticated than the "back of the envelope" that they might have been using for Huckel calculations on organic systems. It could also find a place in the undergraduate teaching curriculum, in organic chemistry or physical chemistry courses that cover Huckel theory. In summary, HMO is easy to learn and inexpensive and can be run on platforms available on most campuses and in most research groups.

(1) Streitwieser, A. *Molecular Orbital Theory for Organic Chemists*; Wiley: New York, 1961.

(2) QCPE, Creative Arts 181, Indiana University, Bloomington, IN 47405.

Michelle M. Francl, *Bryn Mawr College*

HMO. Version 1.3. Dr. Allan Wissner, Department of Oncology and Immunology, Medical Research Division, American Cyanamid Company, Lederle Laboratories, Pearl River, New York 10965. Free.

HMO is a free program, available from the developer (send an 800K, formatted disk and a self-addressed, stamped return envelope to Dr. Wissner). The program runs on a variety of Macintosh computers and is compatible with multifinder running under systems 6 and 7. It has a convenient graphics interface and is otherwise quite user-friendly. The output includes the following: eigenvectors; charge densities; electron density–bond order matrix; electrophilic, radical, and nucleophilic superdelocalizabilities; and energy level and eigenvector diagrams. While it is the policy of this Editor not to review free software (or shareware), this package is unusually well done and can be recommended.

Book Reviews*

The Chemical Synthesis of Peptides. By John Jones (Oxford University). Clarendon Press/Oxford University Press: Oxford and New York. xi + 228 pp. \$75.00. ISBN 0-19-855643-8.

Dr. Jones prepared the text not only in a chronological and scientific style but also with an overview and appreciation of the field with a choice of language and literary skill which makes the text both intellectual and very pleasant to read.

For example, he writes of the proteins that they are "natural polymers which are assembled under nucleic acid control from a menu comprising 19 L- α -amino acids". He also conceives of these proteins as "the very stuff of life, they are present in abundance and diversity in every part of every living thing on Earth".

He estimated that, at present, there are at least 5000 chemists engaged full time in research on peptides and proteins. For these multitudinous chemists, this book is timely.

For peptide synthesis, α -amino protection and α -carboxy protection are surveyed and followed by the organic chemistry of diversified peptide bond formations.

Residue-specific considerations then follow, and the unusual amino acids are not neglected, including N-methyl- α -amino acid, and others.

Perhaps the main theme of the book is on the synthesis of ordinary peptides and proteins in terms of strategy and tactics and then on solution

peptide synthesis, solid phase peptide synthesis, and the Sheppard approach.

The book concludes with the synthesis of conjugated peptides, simple cyclo peptides, and more complex modified peptides.

Adding to the fascination of reading his account of the chemical synthesis of peptides is his tribute to the many pioneers in this field by citing their stepwise discoveries, beginning with Emil Fischer in 1906 and then appropriately the many chemists who followed including Bergmann and Zervas, Rudinger, Sheehan, Brenner, DuVigneaud, Merrifield, Hirschmann, and many others.

His Epilogue is a reflection on the future which gives credit to Rudinger and Hirschmann on predicting the stimulation of discoveries on peptide-releasing factors, new instrumentation including HPLC, high-field FT-NMR, recognized by Veber, and FAB-MS. He justifiably credits advances due to technology as well as to novel chemistry.

He visualizes the future including chemical synthesis of artificial enzymes, asymmetric synthesis, glycopeptide synthesis, and even synthetic vaccines.

This book by Dr. John Jones is highly commendable.

Karl Folkers, *The University of Texas at Austin*

Biomaterials. Novel Materials from Biological Sources. Edited by David Byrom (Biological Products Division, ICI). Stockton Press: New York; Macmillan Ltd.: Hampshire, UK. 1992. viii and 365 pp. \$100.00. ISBN 1-56159-037-1.

*Unsigned book reviews are by the Book Review Editor.

Biomaterials, defined here as biologically produced polymers, are considered from the industrial chemist's viewpoint. The special physical properties, antigenicity, and biodegradability of these natural polymers make them useful in spite of their high cost compared to many unnatural polymers. This volume consists of seven chapters by experts in various fields and a chapter on miscellaneous biomaterials by the editor. The major topics are the polyamides silk and collagen, the polyesters from polyhydroxyalkanoic acids, and the polysaccharides produced by microbes (e.g., cellulose, xanthan, and hyaluronic acid) and algae (alginate). The last chapter adds information on starch-based plastics, polylactide, polyglycolide, polyglutamic acid, mollusc glue, chitin, chitosan, and skin substitutes. Mollusc bioadhesive is the first but will certainly not be the last new biomaterial produced via genetic engineering.

The aspects considered include structure, biosynthesis including in some cases detailed genetic information, physical properties, uses, and metabolism. Some of the important applications of these polymers are in medicine (wound healing, drug delivery, bioadhesives), food and cosmetics (thickening and gelling agents), packaging (shampoo bottles), fibers (silk), oil-drilling (xanthan), and biotechnology (enzyme and cell immobilizing agents).

With many recent references, this book provides a brief update on a broad interdisciplinary subject of much current activity. It should be of interest to polymer chemists, materials scientists, natural product chemists, and biochemists working in this and related areas.

Robert B. Bates, *University of Arizona*

The VSEPR Model of Molecular Geometry. By Ronald J. Gillespie (McMaster University) and István Hargittai (Eötvös University). Allyn and Bacon: Boston. 1991. viii + 248 pp. \$28.20. ISBN 0-205-12369-4.

In their preface, the authors note the purpose of this book is "to give an up-to-date, comprehensive account of the (VSEPR) model, its applications, and its theoretical basis", and aim that it should "be of particular value to teachers and researchers who are interested in the physical basis of the model...". This book does address an up-to-date description of the VSEPR model, particularly by including a chapter on quantum mechanical description of why VSEPR works, in the context of R. F. W. Bader's work. Quite a large number of examples of the various VSEPR geometric groups are given in a manner that was quite well organized. A lot of bonding parameters and pictures are given in the examples, which helps the descriptive process. The book also points out situations in which VSEPR fails and may be expected to be of uncertain predictive utility. As a distillation of the essence of VSEPR theory at a level appropriate to undergraduate and uninformed graduate students, I think this book can be quite a useful first source of information.

As a reference book for researchers who already have some knowledge of VSEPR, the book (in my opinion) is of rather less value. The whole first chapter is devoted to a rapid overview of general chemistry precepts and is solely aimed at the undergraduate level. The second chapter describes techniques for determination of molecular geometry and is again aimed at the undergraduate level, but is so terse as to require that a reader already have expertise in the areas noted in order really to understand of what use are such methods as vibrational and NMR spectroscopy. Chapters 3-6 are quite usefully organized and illustrated, but specific citations for particular structures are not given, rather only end-of-chapter references. As a result, this is not a useful reference for finding original literature work on the various VSEPR structural examples. This is a pity since a nice separate index of molecular structures is contained in the book, making it easy to find individual structures.

Overall, the book should be of use as a detailed introduction to VSEPR theory. If a paperback version becomes available, the (presumably) lowering in price would make it an attractive possibility for general or inorganic chemistry courses. As a potential reference book for an experienced researcher, it could not replace or greatly augment such standards as Cotton and Wilkinson's text, despite the interesting inclusion of quantum mechanical justification of VSEPR.

Paul M. Lahti, *University of Massachusetts*

Preparative and Process-Scale Liquid Chromatography. Edited by G. Subramanian (Loughborough University). Ellis Horwood: New York, London, Toronto, Sydney, Tokyo, and Singapore. 1991. 286 pp. \$109.95. ISBN 0-13-678327-9.

This book is the result of a workshop or short course on preparative liquid chromatography and is an effective presentation in fourteen chapters of the state of the art of the divers practical matters covered. This is not a book for the chemist who merely wants to prepare larger amounts of material based on analytical HPLC experience. Rather, emphasis is on engineering and technical factors of importance to those undertaking large-scale liquid chromatographic operations for recovery of valuable products, whether at laboratory, pilot plant, semi-works, or production levels.

Each chapter is concisely written by an appropriate expert from European industry where the methods are in use; only one chapter is by an American author. Several European terms and undefined acronyms (GMP, CEDI, PTFE, *inter alia*) may be unfamiliar to American readers. Not all chapters cite literature, but many do. Although there are references from 1943, only a few are older than 1980, and most references are from the past five years, many from 1991.

The book opens with a concise comparison of analytical and preparative methods. Seven chapters follow dealing with practical matters of design and operation of systems for pilot plant and production operations, including those dealing with column technology, development, operating parameters, and costs. Ion exchange is treated in one chapter.

In each of these chapters there is a satisfying mix of simple descriptions and complex details such that the reader may grasp each topic at the desired level. For example, in the second chapter dealing with the design of systems, components such as columns, pumps, and valves are evaluated, including automated operations.

Practical applications of large-scale liquid chromatography for production of more costly materials are provided in the last four chapters. Production of fermentation products such as lysine and lactic acid using a continuous moving bed contactor machine with absorption media is presented in detail. Purification of bacterial proteins created by genetic engineering is described using ion-exchange, affinity, hydrophobic-interaction, and gel-filtration methods. The separation of enantiomeric drugs, pesticides, and food additives with chiral column stationary phases (cyclodextrins, crown ethers, microcrystalline cellulose esters, and synthetic polymers) is described in the two final chapters.

Reading the book is easy with a free flow from topic to topic from simple entry-level to advanced specifics. In a common-sense writing style, it contains statements of the obvious but also of detailed treatments of technical points. Both naive and mature needs may be served.

Leland L. Smith, *University of Texas Medical Branch*

Macromolecular Assemblies in Polymeric Systems. ACS Symposium Series No. 493. Edited by Pieter Stroeve (University of California-Davis) and Anna C. Balazs (University of Pittsburgh). American Chemical Society: Washington, DC. 1992. x + 326 pp. \$79.95. ISBN 0-8412-2427-7.

This book was developed from a symposium sponsored by the Division of Polymer Chemistry, Inc., at the 201st National Meeting of the American Chemical Society held in Atlanta, GA, April 14-19, 1991. Following a preface and an introductory chapter by the editors, it contains 23 chapters in typescript form organized under the following headings: Monolayers and Multilayer Films; Three Dimensional Systems; Scanning Probe Microscopy of Macromolecular Assemblies; and Polymers and Liquid Crystals. There are indexes of authors, their affiliations, and subjects.

Catalysis in Polymer Synthesis. ACS Symposium Series No. 496. Edited by Edwin J. Vandenberg (Arizona State University) and Joseph C. Salamone (University of Massachusetts, Lowell). American Chemical Society: Washington, DC. 1992. xii + 292 pp. \$74.95. ISBN 0-8412-2456-0.

This book was developed from a symposium sponsored by the Division of Polymeric Materials: Science and Engineering at the 201st National Meeting of the American Chemical Society held in Atlanta, GA, April 14-19, 1991. Following a preface by the editors and an Overview by Vandenberg, it contains 19 chapters in typescript form organized under the following headings: Transition Metal Catalyzed Coordination Polymerization of Olefins and Diolefins; Ring-Opening Coordination Polymerization of Epoxides; Anionic Polymerization; and Cationic Polymerization. There are indexes of authors, their affiliations, and subjects.

Recent Advances in Chemical Information. Edited by H. Collier (Infonortics Ltd., Calne, Wiltshire). Royal Society of Chemistry: Cambridge, UK. 1992. viii + 226 pp. £39.50. ISBN 0-85186-496-1.

This book was developed from the 1991 International Chemical Information Meeting and Exhibition in Anney, France, September 23-25, 1991. It was attended by some 200 persons. After a short preface by the editor, it contains 17 chapters. There is an author index but no subject index.

The Chemical Industry—Friend to the Environment? Edited by J. A. G. Drake. The Royal Society of Chemistry: Cambridge, UK. 1992. viii + 192 pp. £37.50. ISBN 0-85186-477-5.

This book was developed from a symposium organized by the North East Region committee of the Industrial Division of the Royal Society of Chemistry and held at the University of York, September 24-26, 1991. It contains 13 chapters and a subject index.

Particle Size Analysis. Edited by N. G. Stanley-Wood (University of Bradford) and R. W. Lines (Coulter Electronics Ltd., Luton). Royal Society of Chemistry: Cambridge, UK. 1992. xx + 538 pp. £57.50. ISBN 0-85186-487-2.

This book was developed from the Seventh Particle Size Analysis Conference held at the University of Technology in Loughborough, UK, September 17–19, 1991. After an 8-page preface by the editors, it contains 58 chapters in typescript form followed by a list of exhibitors, an author index, and a subject index.

Nucleophilic Aromatic Displacement: The Influence of the Nitro Group. By François Terrier (Laboratoire de Physico-chimie des Solutions, ENSCP, Paris). VCH Publishers: Weinheim and New York. 1991. vi + 460 pp. \$125.00. ISBN 0-89573-312-9.

This is a very good book.

Aromatic nucleophilic substitution reactions are those in which an aromatic substituent is replaced by another contributed by an attacking nucleophile. Many are workhorse reactions in industry, in laboratory synthesis and in biochemistry. In them, nitro groups are prominent, as activating substituents or as nucleofugal (leaving) groups. While the book's focus is on nitro compound reactions, for purposes of perspective the author gives attention to some processes that don't exactly fit the title, making it almost a general treatment of aromatic nucleophilic substitution.

Although early examples of aromatic nucleophilic substitution appeared in the 1870's, and these reactions became widely utilized, the field as a whole was not surveyed and assembled until about 40 years ago at which time some of the more prominent features of mechanism were also discerned. Considerable research during the 1950's and 1960's served to probe, support, and refine those mechanistic concepts and to outline major characteristics of reactivity as dependent on the identities of activating groups, nucleofugal groups, and nucleophiles. New experimental techniques enabled more searching inquiry into finer aspects of mechanism during the years since 1970 as well as development of extensive knowledge of kinetics and equilibria for formation of anionic σ -complexes, some of which are intermediates in the predominant S_NAr mechanism. Also, these recent years have seen breakthroughs into areas unsuspected in the 1950's, among them photoinduced, "vicarious", and $S_N(ANRORC)$ substitutions.

General treatments of this field have appeared in review articles and in a 1968 book by Joseph Miller, *Aromatic Nucleophilic Substitution*. One important area was treated by E. Bunce, M. R. Crampton, M. J. Strauss, and F. Terrier in their 1984 book, *Electron Deficient Aromatic- and Heteroaromatic-Base Interactions: The Chemistry of Anionic Sigma Complexes*.

The present book is not large or heavy, but it is full of information and exhaustive in its treatment of diverse aspects of the field. Despite its being so comprehensive, one does not feel overwhelmed by detail. The author's style is direct, clear, uncomplicated, and unpretentious, and yet he is successful in communicating nuances. He does not eschew treatment of some muddled areas but presents evidence offered by supporters of various views and avoids heavy-handed judgments, but somehow readers are led to his own point of view. The presentation should satisfy the intellectual appetites of all, whether novices or old hands. This reader misses, however, the friendly French accent of the author.

The book's format is attractive; type, structures, and tables are lucid and legible. There are few of the minor errors of composition that mar some books and papers. In stark contrast is an outrageous blurb on the back cover, which twice declares that the book treats S_NAr *substitutions* (emphasis added).

Joseph F. Bunnett, *University of California, Santa Cruz*

Physics and Chemistry of Materials with Low-Dimensional Structures. Volume 14. Photoelectrochemistry and Photovoltaics of Layered Semiconductors. Edited by A. Aruchamy (University of Arizona). Kluwer Academic Publishers: Dordrecht, The Netherlands. 1992. 357 pp. \$112.00. ISBN 0-7923-1556-1.

This volume is No. 14 in a series of books in which the first six volumes were published as "Physics and Chemistry of Materials with Layered Structures". Since then the series has been split into three series concerned with Layered Structures (A), Quasi One-Dimensional Structures (B), and Molecular Structures (C). The B and C series have been discontinued by the publishers at Volumes 4 and 2, respectively. This volume represents a continuation of the A series, the highlight of which is Hulliger's beautiful volume on the structural chemistry of layer-type phases (Volume 5), which is a starting point for any chemist interested in these low-dimensional systems.

The book is divided into seven chapters. The first chapter by E. Bucher from Konstanz is titled "Photovoltaic Properties of Solid State Junctions of Layered Semiconductors". This chapter presents an exhaustively referenced wealth of information about the basic physics and the types of junctions that have been fabricated on layered semiconductors; plus, he updates the references from previous books in this series, especially in the crystal growth area. The second chapter is by the pioneer of the area of photovoltaic use of layered materials H. Tributsch from the Hahn Meitner Institute in Berlin. He updates the reader on his latest thinking about the chemistry and electronic structure of these materials and how these relate to solar energy conversion. The third chapter by F. Decker and B. Scrosati from Rome and G. Razzini from Milan reviews the impressive progress in photoelectrochemical solar cells based on molybdenum and tungsten dichalcogenides. Chapter four, by C. Levy-Clement from CNRS Meudon and R. Tenne from the Weizmann Institute, reviews the surface modification of layered compounds with chemical and photoelectrochemical techniques.

The fifth chapter entitled "Surface Studies of Layered Materials in Relation to Energy Converting Interfaces" by W. Jaegermann of the Hahn Meitner Institute in Berlin is another exhaustively referenced chapter emphasizing all aspects of UHV studies of layered chalcogenides. The unique and useful properties of the layered compound surfaces are nicely reviewed. This chapter should have a universal appeal to the surface science community which it may not get due to the topical title of this volume. Chapter six is concerned with quantum size effects in layered semiconductor colloids by A. Nozik and M. Peterson from the Solar Energy Research Institute (now NREL), and chapter seven by A. Aruchamy and M. K. Agarwal discusses is entitled "Materials Aspects of Layered Semiconductors for Interfacial Photoconversion Devices". The last chapter has some useful information about doping and thin film growth of layered materials but also contains much redundant information from previous chapters.

This volume contains several excellent chapters and is a valuable source book for an overview and for references to the work on photovoltaic and photoelectrochemical applications of two-dimensional materials. It can be recommended to libraries and researchers who work with layered semiconductors. The main criticism, which is common to such multi-author volumes, is that there is quite a bit of redundancy in both introductory and reviewed material from chapter to chapter. Many figures are reproduced in several chapters and many topics covered multiple times. The editor should have more clearly defined to the authors the topics to be covered or introduced in their chapter to make this collection more coherent.

Bruce Parkinson, *Colorado State University*

Studies in Surface Science and Catalysis. Volume 73. Progress in Catalysis. Edited by Kevin J. Smith (University of British Columbia) and Emerson C. Sanford (Syncrude Canada Ltd.). Elsevier: Amsterdam and New York. 1992. xvi + 406 pp. \$185.50. ISBN 0-444-89556-6.

This book was developed from the pre-conference Proceedings of the 12th Canadian Symposium on Catalysis held in Banff, Alberta, Canada, May 24–28, 1992. The book contains 51 chapters in typescript form organized under the following headings: Hydrogenation; Carbon–Carbon Bond Formation; Homogeneous Reactions; Environmental Issues; and General. There are indexes of authors and keywords.