

give the carboxylic acid and the recovered auxiliary. These conditions allow isolation of the succinic half-ester **8** and the recovery of the chiral auxiliary in high yield. Comparing the sign of the rotation of the half-ester (entry 1) or the diethyl esters<sup>14</sup> (entries 2 and 3) with compounds<sup>15</sup> derived from enantiomerically pure alkylsuccinic acids<sup>16</sup> allows assignment of the absolute configurations.

An explanation for the observed diastereoselectivity is provided by the model presented in Figure 1. This model has three key

(13) Evans, D. A.; Chapman, K. T.; Bisaha, J. *J. Am. Chem. Soc.* **1988**, *110*, 1238–56.

(14) Prepared by treatment of the half-esters with *N,N*-dimethylformamide diethyl acetal: (a) Vorbrüggen, H. *Justus Liebig's Ann. Chem.* **1974**, 821–34. (b) Brechbühler, H.; Büchi, H.; Hatz, E.; Schreiber, J.; Eschenmoser, A. *Helv. Chim. Acta* **1965**, *48*, 1746–71.

(15) (a) (*R*)-(-)-1-Ethyl 2-*tert*-butylsuccinate:  $[\alpha]_D^{20} = -17.2^\circ$  ( $c = 1.85$ ,  $\text{CHCl}_3$ ). (b) (*S*)-(+)-Diethyl cyclohexylsuccinate:  $[\alpha]_D^{20} = +14.9^\circ$  ( $c = 2.3$ ,  $\text{CHCl}_3$ ). (c) (*S*)-(-)-Diethyl hexylsuccinate:  $[\alpha]_D^{20} = -13.5^\circ$ .

(16) (a) (*R*)-(-)-*tert*-Butylsuccinic acid,  $[\alpha]_D^{20} = -26.5^\circ$  ( $c = 5$ , acetone): Polański, T. *J. Chem. Soc., Perkin Trans. 1* **1988**, 629–37. (b) (*S*)-(+)-Cyclohexylsuccinic acid,  $[\alpha]_D^{30} = +26.3^\circ$  ( $c = 1.937$ , EtOH): Naps, M.; Johns, I. B. *J. Am. Chem. Soc.* **1940**, *62*, 2450–7. (c) (*S*)-(-)-Hexylsuccinic acid,  $[\alpha]_D^{15} = -26.6^\circ$  ( $c = 4.00$ , EtOH): Wren, H.; Burns, H. *J. Chem. Soc.* **1920**, *117*, 266–8.

features: (1) the imide carbonyls are opposed, (2) the fumarimide exists as an *s-cis* rotamer, and (3) the benzoxazole ring extends far enough to provide the necessary face-shielding required at the  $\beta$ -position for the asymmetric induction. The origin of the regioselectivity in the addition is not immediately apparent. Preliminary competition experiments between various fumarimide derivatives and diethyl fumarate indicate that the effect is *not* due to increased activation of the  $\beta$ -position of the alkene by the carboximide with respect to the carbethoxy substituent. We are now conducting additional experiments designed to help us understand this regioselectivity effect.

**Acknowledgment.** We gratefully acknowledge the support of this work by the National Institutes of Health. We also thank Professor N. A. Porter at Duke University for providing samples of two of the alkylsuccinic acids and for communicating to us his unpublished results on several occasions.

**Supplementary Material Available:** Experimental procedures for the preparation of fumarimide **4**, radical addition to **4** by the mercury method, and cleavage of addition products **5–7** to succinic acid derivative **8** and auxiliary **3** (2 pages). Ordering information is given on any current masthead page.

## Book Reviews\*

**From CA to CAS Online.** By Hedda Schulz. VCH: New York, 1988. xii + 227 pp. \$39.00. ISBN 0-89573-815-5. English translation of *Von CA bis CAS ONLINE*.

To search CAS ONLINE effectively, a scientist must develop a search strategy based on knowledge of the database. An important part of gaining this familiarity is learning to search the printed indexes in a systematic way. This book succeeds in providing a lucid explanation of the contents, organization, indexing policies, and chemical nomenclature principles of Chemical Abstracts. The first half of the book is devoted to searching Chemical Abstracts manually. For each type of index (Chemical Substance, Patent, General Subject, etc.) sample search questions are provided and the reader is guided through an appropriate search strategy. The author is particularly adept at pointing out changes in Chemical Abstracts over time and implications for the searcher. Various types of abstracts and CASSI entries are illustrated and deciphered. Other parts explained in detail include CASSI and the Registry Index.

The second half of the book, largely a contribution of H. R. Picher, provides an overview of searching CAS ONLINE and thoughtful comparisons of online and manual searching. Descriptions of the CA, CAOLD, and Registry Files are followed by illustrations of important steps and commands used in searching. The section devoted to the Registry File includes a basic introduction to structural searching. Although other hosts are listed with addresses and telephone numbers, emphasis is on STN, and examples are in STN command language. I was unable to find any reference to the Academic Program.

Although not as detailed as the CAS workbooks, this book brings together a wealth of practical information on manual and computerized searching in a clear and readable style. This book is recommended for novices and experienced searchers.

Margaret Manion, *University of Lowell*

**Insect Neuropeptides. Chemistry, Biology, and Action.** ACS Symposium Series No. 453. Edited by Julius J. Menn, Thomas J. Kelly, and Edward P. Masler (U.S. Department of Agriculture). American Chemical Society: Washington, DC, 1991. xii + 260 pp. \$59.95. ISBN 0-8412-1919-2.

This book was developed from a symposium sponsored by the 1989 International Chemical Congress of the Pacific Basin Societies, Honolulu, HA, December 17–22, 1989. It consists of a preface, a table of abbreviations and nomenclature, and 22 chapters in typescript form grouped under the following headings: Perspective; Developmental Neuropeptides; Homeostatic and Behavioral Neuropeptides; Reproductive Neu-

ropeptides; and Biochemistry and Molecular Biology. There are indexes of authors, their affiliations, and subjects.

**Perspectives in Biochemistry. Volume 2.** Edited by Hans Neurath (University of Washington). American Chemical Society: Washington, DC, 1991. x + 318 pp. \$19.95. ISBN 0-8412-1887-0.

This paperback book consists of a collection of concise reviews published in the journal *Biochemistry* in 1989 and 1990 under the heading *Perspectives in Biochemistry*. It consists of a Preface (1 page) and 29 reviews grouped under the following headings: Structure and Function of Proteins; Enzyme Structure and Mechanism; Membrane Proteins and Transmembrane Phenomena; Nucleic Acids and Protein Biosynthesis; Proteolytic Processing and Protein Degradation; Cell Growth and Regulation; and Bioenergetics. There are indexes of authors, their affiliations, and subjects.

**Calcium Magnesium Acetate: An Emerging Bulk Chemical for Environmental Applications.** Industrial Chemistry Library. Volume 2. Edited by D. L. Wise, Y. A. Levendis, and M. Metghalchi (Northeastern University). Elsevier: Amsterdam, Oxford, New York, and Tokyo, 1991. x + 511 pp. \$214.25. ISBN 0-444-88511-0.

CMA, the title compound, is a new bulk chemical emerging on the world market, and it is being used in multimillion ton quantities for two main applications: (1) as a noncorrosive, biodegradable road salt to replace sodium chloride for deicing, and (2) as an additive to coal-fired combustion units to facilitate combustion and to reduce the emission of sulfur in the stack gasses, thereby substantially lowering the formation of "acid rain".

The book contains a preface, biographical sketches of the editors, 18 chapters by different authors, and a subject index.

**Photocatalysis Fundamentals and Applications.** Edited by N. Serpone (Concordia University) and E. Pelizzetti (Università di Parma). Wiley-Interscience: New York, 1989. x + 650 pp. \$75.00. ISBN 0471-62603-1.

In the foreword, the editors state that their objective was to compile a book that could serve as a text for a course in the area of photocatalysis. This objective is clearly fulfilled. The organization and content of this book are such that it could serve as a text for a one-semester seminar course for chemistry, physics, and materials science students. In addition, the editors have avoided a problem common to books that are compiled from chapters written by different authors—that of individual chapters being specialized review articles and redundancy of the material covered by different authors. The editors have taken advantage of the expertise of the contributing authors and have compiled a text which will serve both the student and the more advanced scientist as an excellent source

\* Unsigned book reviews are by the Book Review Editor.

of information in the area of photocatalysis.

The first five chapters cover fundamental aspects of photocatalysis and the physical and chemical properties of molecular, bulk crystalline, and colloidal systems which are commonly used as photocatalysts. This introductory section is followed by four chapters which describe kinetic, thermodynamic, and structural features that are unique to heterogeneous catalytic systems. The latter nine chapters include a comprehensive discussion of a variety of photocatalytic systems including photoelectrocatalysis, organized assemblies, and applications of photocatalysis to problems in organic chemistry, inorganic chemistry, energy-conversion and storage, and hazardous waste management. Overall there is an emphasis on heterogeneous photocatalytic systems; however, two chapters are devoted primarily to transition-metal-based homogeneous photocatalysis.

This book provides a comprehensive and up-to-date coverage of the area of photocatalysis. The only weakness of the text is that, because of the multidisciplinary nature of photocatalysis, it will place significant demands on the beginning graduate-level student. As a result, the text may best serve as a source for an advanced graduate level seminar course and for scientists interested in photocatalysis research.

Kirk S. Schanze, *University of Florida*

**Biological Monitoring of Exposure to Chemicals: Metals.** Edited by H. Kenneth Dillon and Mat H. Ho (University of Alabama). John Wiley & Sons: New York, Chichester, Brisbane, Toronto, and Singapore. 1991. xx + 280 pp. \$80.00. ISBN 0-471-85491-3.

This book is a sequel to *Biological Monitoring of Exposure to Chemicals: Organic Compounds* (1987). It consists of a preface (5 pages) by the editors and 21 chapters by various authors grouped under the following headings: Field Studies, Laboratory Studies, and Reviews. The metals considered are mercury, selenium, nickel, aluminum, lead, arsenic, chromium, vanadium, zinc, iron, copper, and cadmium. There is a list of authors with their affiliations and a subject index.

**Polymer Characterization: Physical Property, Spectroscopic, and Chromatographic Methods.** ACS Advances in Chemistry Series No. 227. Edited by Clara D. Craver (Chemir Laboratories) and Theodore Provder (The Glidden Co.). American Chemical Society: Washington, DC. 1990. xx + 516 pp. \$109.95. ISBN 0-8412-1651-7.

This book was developed from a symposium sponsored by the Division of Polymeric Materials: Science and Engineering at the 196th National Meeting of the ACS in Los Angeles, CA, September 25-30, 1988. It consists of short biographies of the editors, a preface (5 pages), and 26 chapters grouped under the following headings: Polymer Fractionation and Partial Size Distribution; Dynamic Mechanical Analysis and Rheology; Spectroscopy; and Morphology. There are indexes of authors, their affiliations, and subjects.

**Fluid Catalytic Cracking II. Concepts of Catalyst Design.** ACS Symposium Series No. 452. Edited by Mario L. Occelli (Unocal Corp.). American Chemical Society: Washington, DC. 1991. x + 374 pp. \$79.95. ISBN 0-8412-1908-7.

This book was developed from a symposium sponsored by the Division of Petroleum Chemistry, Inc. at the 200th National Meeting of the ACS in Washington, DC, August 26-31, 1990. It consists of a preface by the editor (1 page) and 21 chapters in typescript form. It is a sequel to a volume (ACS Symposium Series No. 375) on the same general subject appearing earlier. This volume, like the previous one, also focuses on the efforts of refiners and catalyst manufacturers to meet crude oil quality problems and environmental issues and regulations as successfully as possible. Theoretical and applied aspects of cracking are discussed; novel concepts and catalyst design are presented along with modern analytical characterization techniques. There are indexes of authors, their affiliations, and subjects.

**Distributed Computer Control for Industrial Automation.** By D. Popovic (University of Bremen) and V. Bhatkar (Center for Advanced Computing, Pune, India). Marcel Dekker, Inc.: New York. 1990. xiii + 712 pp. \$125.00. ISBN 0-8247-8164-3.

This book is designed to serve as a reference volume for a variety of engineers engaged in the planning, design, and application of distributed computer control systems (DCCS) to new or existing chemical processes. It could also be useful to chemists seeking to fully automate synthetic or analytical methods. The reader is expected to have some background in instrumentation and control systems as well as microcomputer hardware and software. A generous number of references are provided for each of the nine chapters but few, if any, references are linked directly to specific sections of the chapters. As expected, the references cover the literature through 1988.

The introductory chapter reviews the evolution of automation in pro-

cess automation prior to DCCS. A conceptual description of a typical DCCS showing the distributed and hierarchical nature of the functions required for automation of a complex industrial plant is presented in Chapter 2. The next chapter focuses on the individual elements of a DCCS system including their linkages and interfaces to the plant operator. The important topic of the data communications required to link the components of a DCCS is the subject of Chapter 4. The longest chapter, Chapter 5, attempts to provide the software concepts and program development tools required for a DCCS. Topics in this chapter include real-time operating systems, communications software, process-oriented languages, and knowledge-based software. The algorithms, which are the heart of DCCS application software, are the subject of Chapter 6. Most of the algorithms common to process control are reviewed in this chapter. The use of modularity in software implementation is stressed. The important subject of reliability is reviewed in Chapter 7 with emphasis on multicomputer systems.

The final two chapters present current applications of DCCS, state-of-the-art and future trends. Applications include conventional power plants, iron and steel mills, waterworks and waste treatment plants, oil and gas production, and chemical plants including biotechnology, pulp and paper, ammonia, glass, and cement. Chapter 9 looks at state-of-the-art programmable controllers and the application of artificial intelligence in process control.

In summary the book provides an inclusive view of current process control technology for engineers. It contains many specific applications and an abundance of diagrams. A glossary of terms would be a welcome addition. At some points, it suffers from characteristics common to works that attempt to provide comprehensive coverage of emerging technology; (1) the scope is broad but the depth is shallow and (2) the material is dated. Even so, the authors have provided a good panorama of DCCS which will be useful to persons who are active in this area.

Frank A. Settle, Jr., *Virginia Military Institute*

**Perspectives in Modern Chemical Spectroscopy.** Edited by D. L. Andrews (University of East Anglia). Springer-Verlag: Heidelberg. 1990. xii + 325 pp. \$45.00. ISBN 0-387-52218-2.

This book is based on a week-long course that has been given at the University of East Anglia over the past decade. The course is designed to give industrial chemists a broad overview of spectroscopic methods and recently available techniques. It is no surprise that the organization and level of the book reflect its origin as a series of survey lectures on a wide variety of spectroscopic methods. The twelve chapters (each written by a different set of authors) are almost evenly divided between surveys of electronic, vibrational, and magnetic resonance techniques. The single chapter on mass spectrometry seems out of place in a book on molecular spectroscopy and leads to an undesirable distinction between what are referred to as "photon spectroscopies" and mass spectrometric techniques. The introductory chapter provides a broad overview of applications of molecular spectroscopy in chemistry but does not integrate the remaining chapters into a coherent whole. The topics appear in almost random order. Chapters on NMR are sandwiched between chapters on luminescence spectroscopy and laser techniques with the final chapter on EPR and ENDOR following the aforementioned review of mass spectrometry. This only serves to reinforce the impression (perhaps unavoidable in something of this sort) of a collection of lectures bound together to form a book.

Individual chapters are well-written with extensive figures and tables, and references are reasonably up-to-date. However, the cursory coverage of a large number of topics and the lack of any over-riding organization makes this an inappropriate choice as a stand-alone textbook. It would be useful as a supplementary text in an upper-level, undergraduate, instrumental analysis course, though the main audience for this book most likely will be practicing analytical chemists who require brief, well-written overviews of standard spectroscopic techniques. This book thus would be most suitable for undergraduate and industrial libraries and for those who might not have the opportunity to attend short courses such as the one which inspired this book.

Ronald L. Christensen, *Bowdoin College*

**The ICI Polyurethane Book. Second Edition.** By George Woods. ICI Polyurethanes and John Wiley and Sons: Chichester, New York, Brisbane, Toronto, and Singapore. 1990. 364 pp. \$84.95. ISBN 0-471-92658-2.

The book is a duplication of the first edition published in 1987 except for the Introduction and a chapter on New Developments. The additional chapter of 27 pages touches on the Montreal protocol and polyurea RIM (Reaction Injection Molding). The book is designed for those engaged in the development and manufacture of polyurethanes. A general view on the basic chemistry, description of raw materials, and machinery available is presented. The book helps one compare urethane practices

in Europe versus those in America. Europeans, for example, have long touted the advantages of polymeric isocyanates in the preparation of molded flexible foams. However, in the States, because the polyether portion of the polyurethane is much less expensive than the isocyanate, toluene diisocyanate with its lower equivalent weight is generally used. An industrial urethane chemist will want this book in his library because it is easy to read and contains several attractive photographs illustrating end uses for polyurethanes. The book is also useful for reviewing processing aids for flexible foams, self-skinning semiflexible foams, elastomers (particularly for shoe soles), and molding or laminating rigid urethane foams. The section dealing with the safety of polyurethanes is helpful and Chapter 11 on testing polyurethanes is particularly good. Table 11-1 lists comparable standard tests for Britain, France, USA, and Germany. A table of conversion factors from metric to English should have been added to the book. The portion on flammability of polyurethanes is commendable but could have been expanded from a historical viewpoint. Much progress has been made and it is an important area for the further development of polyurethanes.

Chapter 13, the new chapter on recent developments, suggests some possibilities for the substitution of blowing agents HFA-123 (HCFC-123, the U.S. designation for a hydrogen chlorofluorocarbon) and HFA-141b for CFC-11 (a chlorofluorocarbon) in urethane systems. The second half of the new chapter discusses polyurea RIM. The high reactivity and flow problems of conventional polyureas based on aminopolyethers can be overcome through the use of imino derivatives. The cure is reported to be the same as that for conventional polyurea RIM—a conclusion not necessarily found to be true by some investigators. The book contains no references to original work and the reader is referred to classic books on polyurethanes listed on the last page. Those intensely interested in polyurethane chemistry will want to refer to these books.

George P. Speranza, *Texaco Chemical Company*

**Journal of Chromatography Library. Volume 46. Ion Chromatography. Principles and Applications.** By Paul Haddad and Peter Jackson (University of New South Wales). Elsevier: New York, Amsterdam. 1990. xxi + 776 pp. \$191.50. ISBN 0-444-88232-4.

This is an extensive book (22 chapters; two appendices) which devotes roughly 70% to a detailed discussion of the theoretical aspects of the chromatographic separation of inorganic and organic ions by various techniques. The treatment starts with ion exchange methods and then covers ion interaction (ion-pairing), ion exclusion (hydrophobic interaction), and miscellaneous methods. For each method discussions on mechanisms, stationary and mobile phases, and retention models are provided. An extensive chapter on detection methods is then presented which covers various electrochemical, spectroscopic, and post column reaction techniques. Sample handling and methods of development are then discussed in separate chapters. The book contains many useful figures, chromatograms, and illustrations (over 240) which are well chosen to support the text. It is a comprehensive reference, rather than a teaching textbook. A large amount of descriptive material is included, and the theoretical mathematical sections have been separated, rather than interwoven, for the convenience of interested readers.

The remaining 30% (seven chapters) of the volume is devoted to applications. This material is not presented in the usual narrative format, but instead in a series of chapters containing tables arranged by subject area, including environmental, industrial, food, clinical, metals, and water analysis applications. These thoroughly cover the literature from 1975 to early 1989. Each table gives the sample type, the solutes analyzed and their retention times, sample preparation method, column, eluent, and detector used for each reference cited (approximately 1250). The authors' stated intent is to allow the reader to replicate the separation without examining the original reference. Each chapter begins with a brief flowchart which shows the types of samples described in each table, so that the reader can locate specific applications quickly and easily. The index is extensive and includes figures and tables as well as subjects.

The authors have compiled, in a single reference volume, all of the important developments in ion chromatography from its inception to the

recent past. Their treatment is thorough and thoughtfully organized for the practitioner, and it provides an excellent overview of this increasingly diverse subject. It will be useful to both research scientists and those in analytical service groups.

William Van Willis, *California State University, Fullerton*

#### Volumes of Proceedings

**Photon Migration in Tissues.** Edited by Britton Chance. Plenum Press: New York and London. 1989. x + 195 pp. \$62.50. ISBN 0-306-43522-5.

A "workshop" held in Philadelphia in 1988 was the origin of the 13 typescript papers making up this volume. After a summary report by the Editor, the papers are grouped under three headings: Theoretical Aspects, Experimental Studies, and Instrumental Aspects. An index of contributors and a short subject index are included.

**Transforming Growth Factor- $\beta$ s; Chemistry, Biology, and Therapeutics (Annals of the New York Academy of Sciences. Volume 593).** Edited by Karl A. Piez and Michael B. Sporn. The New York Academy of Sciences: New York. 1990. 379 pp. \$100.00. ISBN 0-89766-573-2.

This softbound volume contains papers given at a conference held in Arlington, Virginia, in 1989. In a short preface, the Editor compares the importance of TGF- $\beta$ s to that of insulin, cyclic AMP, and immunoglobulin. TGF- $\beta$ s have a variety of valuable properties, among which is the ability to promote the formation of new connective tissue.

After an introductory overview, the papers are grouped under six headings: Molecular Biology; Control of Activity and Bone; Soft Tissue; Immunology and Cell Biology; Epithelium: Repair and Development; and Cancer and Pharmacology. In addition, a large group of poster presentations is included. There is an index only of contributors.

**Biosensor Technology: Fundamentals and Applications.** Edited by Richard P. Buck, William E. Hatfield, Mirtha Umana, and Edmond F. Bowden. Marcel Dekker, Inc.: New York. 1990. x + 419 pp. \$99.75. ISBN 0-8247-8414-6.

This is a collection of 29 typescript papers derived from an international symposium held at the University of North Carolina in 1989. The content is a mix of tutorial lectures, invited lectures, and poster presentations. The arrangement includes an introductory lecture, Sensor Issues for the 1990's, by R. P. Buck, and other papers in three sections: (II) Microelectrodes and Microelectronic Devices; (III) Modified Electrodes, Amperometric, and Potentiometric Sensors; and (IV) Optical and Acoustic Wave-Based Sensors. There is a thorough subject index.

**Crystallization as a Separations Process. ACS Symposium Series 438.** Edited by Allan S. Myerson and Ken Toyokura. American Chemical Society: Washington, DC. 1990. xi + 419 pp. \$94.95. ISBN 0-8412-1864-1.

There are 29 reports of original research and one review in this collection of papers given at a symposium held in Honolulu in 1989. The review is Crystallization Research in the 1990's: An Overview, by A. S. Myerson. The other papers are grouped under four headings: Basic Studies; Crystallizer Operation and Control; Crystallization of Organic Molecules and Biomolecules; and Crystallization and Precipitation of Inorganic Compounds. The papers are reproduced from typescript, to which running heads have been added (a welcome feature!). Indexes of contributors, affiliations, and subjects are included.

**Biochemistry of Chemical Carcinogenesis.** Edited by R. Colin and Jan Hradec. Plenum Press: New York and London. 1989. ix + 267 pp. \$65.00. ISBN 0-306-43381-8.

A meeting on the title subject was held in Prague in 1988 as a satellite to the 4th International Congress of Biochemistry. It consisted of "invited papers, oral presentations, and posters", but these are not distinguished in the Table of Contents. All papers begin with an abstract, except the opening paper, Chemical Carcinogenesis and the Primary Prevention of Human Cancer, by Lorenzo Tomatis. A very brief subject index (1 page) is included.