

benzyl ether (HCO₂NH₄, THF/H₂O 4:1, 10% Pd/C, 23 °C, 30 min, 100%) and the *t*-BOC protecting groups (3 N anhydrous HCl-EtOAc, 23 °C, 30 min) of (-)-1S-15 and (+)-1R-15 afforded the unstable indoline hydrochlorides 16, which were coupled directly with synthetic PDE-I dimer (5)¹⁰ in the presence of EDCI (3 equiv, DMF, NaHCO₃, 23 °C, 24 h) to provide 1S-17 and 1R-17, respectively. Final spirocyclization (Wierenga-Kelly Winstein Ar-3' alkylation)⁷ was effected by treatment of 1S-17 and 1R-17 with 1:1:1 Et₃N/H₂O/CH₃CN (23 °C, 30 min) and afforded (+)-CC-1065 (1, [α]_D²³ = +90° (c 0.062, DMF)) and *ent*-(-)-CC-1065 (2, [α]_D²³ = -92° (c 0.075, DMF)),¹⁵ respectively.¹⁷

Acknowledgment. This work was assisted by the financial support of the National Institutes of Health (CA 41986), the Alfred P. Sloan Foundation, and Purdue University (David Ross Fellowship to R.S.C.). We thank Dr. Robert C. Kelly of The

Upjohn Company for providing a comparison sample of naturally occurring (+)-CC-1065, for preprints of their work (ref 5 and 7), and for many helpful discussions.

Supplementary Material Available: Full physical and spectral characterizations of 3-17, 1, and 2 are provided (8 pages). Ordering information is given on any current masthead page.

(17) Synthetic CC-1065 prepared in this manner was shown to be identical by SiO₂ TLC (20% DMF-toluene), [α]_D²³, ¹H NMR (DMSO-*d*₆, 300 MHz), IR (KBr), and FABMS with an authentic sample of natural (+)-CC-1065. The [α]_D²⁵ for natural (+)-, semisynthetic (+)-, and semisynthetic *ent*-(-)-CC-1065 have been reported to be +97°, +98°, and -96° (c 0.2, DMF),⁷ respectively. In the present investigation, [α]_D²³ for natural (+)-CC-1065 was determined to be +93° (c 0.067, DMF). In the present investigation, the *in vitro* cytotoxic activity of natural (+)-, synthetic (+)-, and synthetic *ent*-(-)-CC-1065, respectively, were determined to be the following: 1.1, 1.2, and 1.3 × 10⁻⁵ μg/mL (L1210); 1.4, 1.8, 1.3 × 10⁻⁵ μg/mL (B16).

Additions and Corrections

Remarkable Effects of Lone Pair-Lone Pair Interactions on the Extremely Stereoselective [2 + 2] Cycloaddition of Azidoketene to Chiral 3-Imino-β-lactams [*J. Am. Chem. Soc.* 1987, 109, 1798]. IWAO OJIMA,* KAZUAKI NAKAHASHI, STEPHAN M. BRANDSTADTER, and NAOTO HATANAKA

Page 1801: In Scheme V, the compound designations for IIA and IIB should be reversed.

Book Reviews*

Advances in Heterocyclic Chemistry. Volume 41. Edited by A. R. Kartzitzky. Academic Press: Orlando. 1987. vii + 376 pp. \$85.00. ISBN 0-12-020641-2

The six chapters in this volume treat subjects new to the series. Synthesis of Heterocycles from Hydrogen Cyanide Derivatives, by D. S. Donald and O. W. Webster, deals with the elaborate chemistry built upon the dimers and oligomers of HCN, important industrially and in the search for insight into the paleological origin of organic compounds. T. S. Gilchrist reviews the anions of 5-membered heteroaromatic rings with attention to ring-opening reactions. F. Taddei and colleagues present a critical discussion of the barriers to free rotation in the *C*-acyl and *N*-acyl heterocycles. The Basicity and Acidity of Azoles is the subject of a chapter by J. Catalan, J. L. M. Abbond, and J. Elguero. Oxidative Transformations of Heteroaromatic Iminium Salts, exemplified by pyridinium salts, have been the subject of much recent attention and are reviewed by H. Weber. A ring system not reviewed before, the pyrazolopyrimidines, is the subject of the final chapter, by M. H. El Nagadi, M. R. H. El Moghayar, and G. E. H. El Gemeie. The high quality of content and production that characterizes this series is maintained.

High-Energy Processes in Organometallic Chemistry. ACS Symposium Series. No. 333. Edited by Kenneth S. Suslick (University of Illinois at Urbana-Champaign). American Chemical Society: Washington, DC. 1987. vii + 336 pp. \$69.95. ISBN 0-8412-1018-7

This book, which was developed from a symposium sponsored by the division of inorganic chemistry at the 192nd meeting of the American chemical society, Anaheim, Ca, is composed of 19 chapters and author and subject indexes. It is written by academic and industrial researchers who are currently very active in high-energy processes in organometallic chemistry.

The first chapter gives a historical background to the development of high-energy processes, which started as early as 1929, by F. A. Paneth. Some of the chapters discuss different aspects of high-energy processes, from current studies in the gas phase of the organometallic chemistry to the study of photochemical reactions and the investigation of some highly reactive intermediates and metal powders. The remaining chapters discuss some techniques and applications in high-energy processes involving infrared spectroscopy for examining the structure and behavior of intermediates involved in organometallic chemistry, electron spin resonance spectroscopy in the study of radiolysis of transition-metal compounds, ultrasonic waves for heterogeneous reactions, electrochemiluminescence of organometallics and finally plasma, and ion and electron beams for synthesis and modification of inorganic systems.

Sultan T. Abu-Orabi, Yarmouk University, Jordan

Formulas, Facts and Constants, For Students and Professionals in Engineering, Chemistry and Physics. Second Edition. By Harold J. Fischbeck (University of Oklahoma) and Kurt H. Fischbeck (University of Heidelberg). Springer-Verlag: Berlin, Heidelberg, and New York. 1987. xv + 260 pp. \$23.00. ISBN 3-540-17610-1

Although the title identifies chemists as one of the groups for whom this book is intended, only those whose work is very close to engineering will find it useful. The first section (108 pages) is essentially mathematical and includes trigonometric functions, vectors, etc. The second part is headed "Units, conversion factors, and constants" and is arranged according to kind of property: mass, pressure, energy, etc. This is a useful arrangement. Section 3, "Spectroscopy and atomic structure", considers only the spectroscopy of atoms and totally ignores molecular spectroscopy. The fourth section is on wave mechanics and includes a range of equations. The last section is called "Facts, figures, and data useful in the laboratory". It is concerned with vacuum phenomena, flow, electronic properties, and radiation (especially γ), for the most part. Some physical-chemistry laboratories would find it useful; those who

*Unsigned book reviews are by the Book Review Editor.

work with compounds or reactions will find it of little or no use.

It is softbound; that feature does not seem consistent with an expectation of heavy use. The index is modest, but the detailed table of contents should make access to desired information easy, if the subject falls within the book's restricted purview.

Quantum Chemistry of Atoms and Molecules. By P. S. C. Matthews (Trinity College, Dublin). Cambridge University Press: New York, 1986. viii + 167 pp. \$44.50. ISBN 0-521-24854-X

This slim volume is an introductory textbook in bonding theory and spectroscopy for undergraduates. It covers standard topics of a junior-year physical chemistry course, but at a considerably lower level than, e.g., Karplus and Porter's *Atoms and Molecules*. Indeed, its basic level often approaches that of a textbook in general chemistry, with quite modest expectations concerning the student's level of mathematical competence ("If you know nothing about complex numbers don't attempt this question," the author advises on page 37). Formulas are generally presented without deviations in a heuristic, conversational style, with additional mathematical backbone supplied in supplemental "boxed" material, illustrations, or worked problems. A novel feature of the book is its modular, heirarchical organization, with boxed appendix material gathered at the end of each chapter that "can be left on a first reading and returned to later". The book's exposition is generally clear and plain, though somewhat marred by a penurious attitude toward commas.

Part 1, Fundamentals (~100 pages), consists of the five chapters (Particles and Waves; Schrödinger's Equation and Wavefunctions; Electrons in Atoms; Electrons in Molecules; Spectroscopy) that constitute the core material of the book. Part 2, Taking It Further (~30 pages), consists of a chapter (Formal Quantum Theory) that explains complex numbers, vectors, expectation values, and other concepts of a more mathematical nature, and a final chapter (Advanced Methods of Quantum Chemistry) that briefly introduces the variational principle, harmonic oscillator ladder operators, Zeeman effect, and a few other miscellaneous topics. The author's explanation for this rather incoherent assortment of leftovers is that "the examples...have been somewhat arbitrarily chosen, but they do show something of the quantum chemist's armoury."

Considering the relatively low level of treatment, the pedagogical shortcuts often seem deftly adopted, reflecting an apt perspective on modern topics (e.g., the brief discussion of electron correlation or the SCF flowchart of Figure 3.14). However, there are inevitably errors or misstatements at which the practicing quantum chemist will wince, such as the identification of the momentum-space formulation of quantum theory at the "Heisenberg representation", the incomprehensible remark that "unlike Russell-Saunders coupling, spin-orbit coupling is a property of nature", or the advice that it "would be a mistake to think that an atom or molecule 'has' a wavefunction whose form we are trying to discover."

This is a book for beginning students wanting a descriptive overview of elementary bonding theory and spectroscopy. Within the constraints of such a resolutely nonmathematical approach, the treatment is reasonably successful.

Frank A. Weinhold, *University of Wisconsin, Madison*

Geochemical Processes at Mineral Surfaces. ACS Symposium Series 323. Edited by James A. Davis and Kim F. Hayes. American Chemical Society: Washington, DC. 1986. 683 pp. ISBN 0-8412-1004-7

This volume includes 32 papers which were presented at a symposium on geochemical processes at mineral-water interfaces in 1985 and which bring to bear on this area a very wide range of expertise. The discontinuities in properties which occur at the mineral-water interface have profound effects on the movement of naturally occurring ions. Weathering and precipitation processes control the concentrations and speciation of ions in natural waters and the movements of these within the hydrosphere; both classes of processes take place at mineral-water interfaces.

After an introductory overview, the book is divided into seven major

sections, each dealing with one of the aspects of the processes occurring at the mineral-water interface. Five papers deal with the physical properties of the mineral-water interface; these represent a well-balanced mix of experimental and theoretical (mathematical modeling) work. Adsorption phenomena are dealt with in another set of four papers; these are largely experimental in character. Ion-exchange processes are discussed in four papers, one of which addresses the use of relaxation methods to study ion exchange kinetics at the microscopic level. Spectroscopic techniques (including electron-spin resonance and Mössbauer spectroscopy) are utilized in four papers. Chemical reactions, mainly redox processes, at mineral-water interfaces are treated in four papers, one of which deals with non-biological organic reactions. Solid-solution formation and equilibria are the subjects of another set of four articles, and the last group of papers deals with the processes involved in precipitation and dissolution, including weathering.

The authors and the editors of this volume should be complimented on the uniformly high quality of the material presented and the logical organization of the book. This last makes the work accessible to the many non-specialists who need to be aware of the developments in this field—environmental engineers, soil chemists, mining engineers, geochemists, geologists, hydrogeologists, oceanographers, etc. The extensive references provided with the papers are also most helpful.

David J. Wilson, *Vanderbilt University*

Polymer Products: Design, Materials and Processing. By D. H. Morton-Jones (University of Lancaster) and J. W. Ellis (Singapore Polytechnic). Chapman and Hall Ltd.: London and New York. 1986. xi + 344 pp. \$45.00. ISBN 0-412-27130-3

This is a novel type of textbook for introducing polymers, particularly their processing and use for engineering students. It consists of many real examples of polymers at work instead of arranging the materials according to the academic way. The teacher or student can start with a product which is in common use and work backwards to its manufacturing process. This will capture the interest of students from the very beginning and will last throughout the lectures.

Each subject is a separate chapter in this text. There is a "PST" (Polymer Science and Technology) chapter ahead of the relevant subjects. The five PST chapters are (1) Injection moulding and its materials, (2) Form cored mouldings, (3) Polyurethanes, (4) Glass-reinforced plastics (GRP), and (5) Rubbers. For example, after PST 3: Polyurethanes, there are three chapters relating to reinforced reaction moulding (RRIM), polyurethane shoe soles and printed gaskets in hydraulic control equipment. Besides, several chapters not covered by the PST headings are also included; they are blow moulding, chemical effluent pipe in HDPE, and heat-shrinkable terminations for power cables.

This book is an ideal source of material for a course in university and polytechnic departments of engineering or materials science, as well as being a valuable reference work for materials engineers in industry. It also serves as a guide for research workers in polymer science who aim their research toward practical purposes.

Tongyin Yu, *Fudan University*

Specialist Periodical Reports—Heterocyclic Chemistry. Volume 5. Senior reporter: H. Suschitzky (University of Salford). The Royal Society of Chemistry: London. 1986. xix + 508 pp. \$198.00. (Available from the American Chemical Society, Washington, D.C.) ISBN 0-85186-843-6

Volume 5 of *Heterocyclic Chemistry* reviews the literature citations found in volumes 97 and 98 of *Chemical Abstracts*. As found in previous volumes of this series, this specialist periodic report is organized by ring size and ring content. A final chapter on bridged systems completes the report. The extensive table of contents serves in place of an index, which is understandable when one considers that the volume contains over 2700 chemical structures and 2500 references. This volume is a useful reference for anyone interested in the field of heterocyclic chemistry.

James R. Zeller, *Parke Davis Company*

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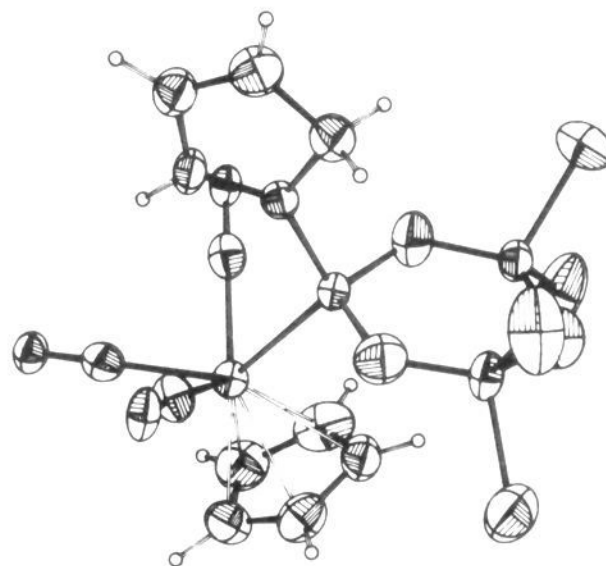
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