Book Review

Optical Spectra and Chemical Bonding in Transition Metal Complexes. Special Volume II Dedicated to Professor Jørgensen. Structure and Bonding, 107 Edited by Thomas Schönherr (Heinrich-Heine-Universität, Dusseldorf, Germany). Series Edited by D. M. Mingos. Springer-Verlag: Berlin, Heidelberg, New York. 2004. xvi + 310 pp. $239.00. ISBN 3-540-00854-3.

Marc W. Perkovic

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BOOK REVIEWS

Amines: Synthesis, Properties and Applications. By Stephen A. Lawrence (Mimas Ltd.). Cambridge University Press: Cambridge, U.K. x + 372 pp. $180.00. ISBN 0-521-78284-8.

Amines appears to be the first monograph dedicated to this vast topic of organic chemistry. The book is well structured, with topics logically divided into eight chapters. The introductory chapter presents a thorough outline of the history of amines and the problem of nitrogen fixation with emphasis on its great importance to mankind. The development of industrial processes of nitrogen fixation, up until today's modern method of ammonia production using the Haber−Bosch process, is very well researched and described. A section on the chemistry of ammonia ends the chapter and presents useful information on the structure, binding, properties, and main reactions of this important molecule. Chapter 2 focuses on aliphatic amines, including cyclic derivatives, diamines, and polyamines, including their biosynthesis. The fundamental aspects of these compounds, i.e., structure and properties, and other important concepts such as basicity, ionization energies, and amine inversion are addressed, as are the traditional preparative methods and reactions of amines. Because the list of literature citations is short and based mainly on the original literature, it contains very few recent references. There are few specific examples of transformations, and most of the equations are generic ones that tend to lack details on the yields of and conditions for reactions; only substrates and main reagents are shown without any information on typical solvents, additives, and temperature.

In Chapter 3, arylamines (anilines), with separate sections on monoaryl, diaryl, and triarylamines, are described. Here as well, the description of preparative methods is in the form of a general overview, with no particular emphasis on modern methods. For example, only one generic equation and a short paragraph are devoted to the Buchwald−Hartwig process. Heterocyclic amines are considered in Chapter 4, which is subdivided into classes of heterocycles, from aziridines to larger ring systems, and touches on selected aspects of their structure, properties, preparation, and reactivity. Chapter 5 is devoted to inorganic amines, hydrazine, hydroxylamine, and amine ligands, including macrocyclic ligands, e.g., heme. An overview of the historical aspects, structure, properties, synthesis, and major reactions of these amine derivatives is provided.

Most industrial syntheses of simple aliphatic amines involve reactions of ammonia with alcohols and alkyl halides, followed by fractionation of product mixtures. Aromatic amines are prepared mainly by reduction of nitroarenes. These commercial amines are often employed as starting materials to access more complex ones. Accordingly, Chapter 6, entitled "Small scale syntheses and analytical methods for amines", includes 19 model experimental protocols for the preparation and reactions of amines (aliphatic, aromatic, dyes, etc.), such as the Hoffman reaction, alkylations and reductions of different functionalities, the Sandmeyer reaction, protection of amino acids, the Fischer indole synthesis, and several others. Missing from these model procedures are modern methods, such as nucleophilic additions to imines and transition metal-catalyzed aminations of aryl halides. In the second part of Chapter 6, analytical methods for amines, including qualitative tests and spectroscopic techniques, such as infrared and nuclear magnetic resonance, are addressed. Unfortunately, mass spectrometry is not discussed. Amine oxides and amino acids and the most popular methods for protecting amines as Cbz, Boc, and Fmoc derivatives are the subjects of Chapter 7. The most important commercial applications of amines are described in Chapter 8, which is divided into several specific examples of applications: corrosion inhibitors, pharmaceuticals, anticancer agents and DNA alkylators, cosmetics and toiletries, color reprography, hydrazines, agrochemicals (fungicides, herbicides, pesticides), azine and azo dyes, and indigo dyes.

The book ends with three appendices: 1. "Molecular structures and isosurface electronic charges of selected amines", 2. "Physical properties of selected amines" with more than 40 being listed, and 3. "Name reactions involving amines", which consists of a seemingly exhaustive list of 200 name reactions that I found to be particularly useful.

This monograph on amines is definitely of the "overview" genre. Although it rarely goes into comprehensive detail due to the immensity of the topic, it does contain a bit of everything about amines. As such, it constitutes an excellent starting point for students or nonexperts researching this class of compounds. Experts of synthetic organic chemistry, however, would be disappointed by the dearth of modern topics such as solid-phase techniques, asymmetric synthesis, and transition metal-catalyzed processes for the preparation of amines. Nonetheless, the book is unique because it provides a concise overview on several aspects of amines, making it a valuable addition to the libraries of universities and industrial organic chemistry laboratories.

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Optical Spectra and Chemical Bonding in Transition Metal Complexes. Special Volume II Dedicated to Professor Jørgensen. Structure and Bonding, 107. Edited by Thomas Schönherr (Heinrich-Heine-Universität, Dusseldorf, Germany). Series Edited by D. M. Mingos. Springer-Verlag: Berlin, Heidelberg, New York. 2004. xvi + 310 pp. $239.00. ISBN 3-540-00854-3.

This book is the second of two volumes that honors the memory of C. K. Jørgensen. We owe a great deal to Jørgensen and others of his generation, pioneers in the understanding of structure and bonding in transition metal complexes. Although

Unsigned book reviews are by the Book Review Editor.

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he helped frame many of the arguments regarding the electronic structure of coordination compounds, this volume illustrates the dichotomy between how much we know and how little we understand: ligand field theory, orbital mixing, and selection rules are still active areas of study.

The reviews within the text cover a relatively narrow set of topics, mostly spectroscopic and theoretical advances that have occurred in the last several years. The authors of each review are top investigators in their subject areas. Each review is detailed, in some cases to a fault, as they may be difficult to penetrate by those with only a casual understanding of the topics covered. However, each author has done a good job of covering his or her respective literature, making available a map for the intrepid explorer willing to dive in. It is unfortunate, however, that the broad area of photoreactivity was not really addressed in this volume.

It is difficult to balance a review in which the goal is to pay homage to a great pioneer in understanding the structure and bonding of transition metal complexes on one hand, and to cover the most recent advances that this understanding has facilitated on the other. A few of the authors did a good job of providing the context of how their work builds upon Jørgensen's foundation, although there were also others who provided no such context. The highly focused nature of the reviews means that they will be invaluable to other experts in each respective field, but few of these reviews would be a good starting point for a novice.

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Handbook of Food Analytical Chemistry. Volumes 1 and 2. Edited by Ronald E. Wrolstad (Oregon State University), Terry E. Acree (Cornell University), Eric A. Decker (affiliation not given), Michael H. Penner (Oregon State University), David S. Reid (University of California, Davis), Steven J. Schwartz (Ohio State University), Charles F. Shoemaker (affiliation not given), Denise Smith (University of Idaho), and Peter Sporns (University of Alberta). John Wiley & Sons, Inc.: Hoboken, NJ. 2005. xvi + xvi + 1374 pp. $260.00 (set). ISBN 0-471-72187-5 (set).

This handbook was derived from the Wiley publication *Current Protocols in Food Analytical Chemistry*, a manual that was published in loose-leaf and CD-ROM formats from January 2001−December 2003. It provides detailed experimental descriptions, background information, and troubleshooting tips for an array of procedures in food analysis. Each section also includes anticipated results, time considerations, literature cited, and key references. Volume 1 covers analytical procedures and issues involving water, proteins, enzymes, lipids, and carbohydrates. Volume 2 deals with pigments and colorants, flavors, texture/rheology, and bioactive food components and includes four appendices: (1) Abbreviations and Useful Data, (2) Laboratory Stock Solutions, Equipment, and Guidelines, (3) Commonly Used Techniques, and (4) Selected Suppliers of Reagents and Equipment. A subject index completes the set.

JA059701S

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Chemical Reagents for Protein Modification, 3rd ed. By Roger L. Lundblad (Consultant in biotechnology, Chapel Hill, NC). CRC Press: Boca Raton, FL. 2005. xii + 340 pp. $129.95. ISBN 0-8493-1983-8.

This volume updates the time-honored monograph *Chemical Modification of Proteins* by Means and Feeney published in 1971. Potential readers of this volume will likely be familiar with this earlier work, which not only provided access to some detailed procedures but also did a marvelous job of explaining the organic chemistry of the processes of modification. The Lundblad volume is written more from the point of view of a practitioner of organic chemistry, rather than a teacher of it. In this regard, the third edition (this reviewer has not seen the first two editions) provides a much more comprehensive survey of the literature than given in the Means and Feaney monograph. This mostly reflects the large volume of literature that has appeared in the last 30+ years on protein modification. Lundblad has clearly done an expert job of collating information from an extensive and more complicated body of literature.

The book begins with a general chapter on how chemical modification has become especially important to studies of proteomics and biotechnology. The author discusses the concept of site-specific modification, affinity tagging, spin-labeling, and solid-phase tricks for separations and purifications. Chapters 2−10 are detailed discussions of chemical modification of the nine key protein functionalities: amino groups, histidine residues, arginine, carboxyl groups, cysteine, cystine, methionine, tyrosine, and tryptophan. The cystine chapter contains an appendix with a step-by-step procedure developed in the author's lab for the reduction of disulfides and carboxymethylation of proteins to prepare them for hydrolysis by trypsin. In each of these chapters there are extensive tables with references to the literature so that the reader can view in summary fashion the range of conditions that have been used to accomplish a particular modification. This is quite useful considering how sensitive a given protein modification may be to varied reaction conditions. In regard to the vagaries of outcomes of modifications as a function of reaction conditions, it is interesting that the author chastises the scientific community in the preface for frequently omitting details of procedures, such as exact temperatures, that he recognizes so crucially affect the reproducibility of the outcomes. Lundblad's critical choice of which published procedures he considers reliable is supplemented in several places by his own, often unpublished, improvements and recommendations on the protocols of modification.

In Chapter 11, he discusses cyanogen bromide and related procedures for cleavage of the peptide bond. Finally, there is a short final chapter on chemical cross-linking agents. There is also a useful table of changes in molecular weight associated with derivatizations of common side chains, as well as a detailed procedure for assaying the concentration of the resulting proteins. The comprehensive index is thorough and usefully subindexed.

The chapters are written in continuous narrative form and are unfortunately without headings to separate the different classes of modification for each amino acid side chain. In this regard, this reviewer preferred the clear organization in outline form provided by Means and Feeney. The author's decision to omit subheadings may reflect the fact that coverage of the major modification types is interspersed in many cases with unusual or hybrid procedures that do not fit cleanly into such a style. Although the text does not generally provide step-by-step procedures, so much information is given on experimental conditions that if the reader cannot create an experimental protocol directly from the description given, the reader can at least readily select which of several literature references would likely provide the more useful procedure for accomplishing the modification of interest.

The most unfortunate shortcoming of this new edition is the large number of errors in the figures associated with chemical structures and reactions; this reviewer counted 13 such errors, in addition to several typos. Despite the confusion this may cause for the nonchemist, this volume is by far the most encyclopedic resource to procedures in chemical modification and the corresponding literature. Every lab working on the chemistry of proteins and biotechnology will want to have a copy of this reference on the shelf.

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Progress in Colloid and Polymer Science, Volume 127. Analytical Ultracentrifugation VII. Edited by M. D. Lechner (Universität Osnabrück, Germany) and L. Börger (BASF Aktiengesellschaft, Ludwigshafen, Germany). Series edited by F. Kremer and W. Richtering. Springer: Berlin, Heidelberg, New York. 2004. viii + 162 pp. $149.00. ISBN 3-540-20203-X.

This book was developed from the 13th International Symposium on Analytical Ultracentrifugation held at the University of Osnabrück, Germany, in March 2003. Its 19 chapters are organized into the following subject areas: Technical Methods, Data Analysis, Innovations; Polymers, Colloids, Supramolecular Systems; Biological and Interaction Systems; and Hydrodynamics and Modelling. An author/title and a keyword index complete the book, which is also available electronically.

JA0597045

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Validation in Chemical Measurement. Edited by Paul De Bièvre (Kasterlee, Belgium) and Helmut Günzler (Weinheim, Germany). Springer: Berlin, Heidelberg, New York. 2005. x + 168 pp. $159.00. ISBN 3-540-20788-0.

This anthology is a collection of 31 papers on the topic of validation as published in the journal *Accreditation and Quality Assurance* mostly during 2000−2003. A sampling of the chapters includes "Measurement uncertainty and its implications for collaborative study method validation and method performance parameters", "Validation requirements for chemical methods in quantitative analysis − horses for courses?", and "Marketing valid analytical measurement". There is no index.

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Mixed Surfactant Systems, 2nd ed., Revised and Expanded. Volume 124 of the Surfactant Science Series. Edited by Masahiko Abe (Tokyo University of Science) and John F. Scamehorn (University of Oklahoma). Marcel Dekker: New York. 2005. xiv + 832 pp. $179.95. ISBN 0-8247-2150-0.

This latest addition to the Surfactant Science Series evolved from a symposium held at PACIFICHEM 2000 in Hawaii and includes 21 articles written by a combination of 47 authors. It has a notable academic slant, with only three of the contributors coming from industry, and the remainder from academic institutions and research institutes. Not surprisingly, the references extend through the year 2000, although there are a few that were ostensibly added after the symposium.

The work is not explicitly organized into themes, and the articles are clearly set up for selective, rather than successive, reading. The coverage conveys a sense of thoroughness, aided by an average article length of more than 37 pages. The book is anchored by the first article that focuses on the thermodynamics of the mixing of binary surfactant systems. Solubilization of solutes in such solutions is described in Chapter 8, whereas Chapter 2 provides an interesting treatment of microphase separation in monolayers. Further developments in microscopic phase separation are presented in Chapter 13, followed by two articles on differential conductivity and diffusion processes, and two more on micellar structure in mixed surfactants. Chapters 9−11 address phase behavior and microstructure, including liquid crystals and sponge structures.

The volume includes a chapter (12) on gel phases, which offers informative micrographs of unilamellar vesicles. Chapters 14−17 provide specialized discussions on dynamic interfacial properties, aggregation control by external stimuli, and adsolubilization, respectively. A thorough treatment of precipitation in surfactant mixtures is presented in Chapter 18, which also briefly touches on cloud point phenomena. Polymer−surfactant interactions are dealt with in the following chapter, which is especially extensively referenced. The next chapter presents an interesting discussion of a rather exotic subject: the determination of kinetic parameters from ultrasonic relaxation studies. Last but not least, the final chapter deals with photocatalysis in a number of mixed ionic and nonionic surfactant systems.

As is the case with most volumes in this series, Volume 124 allows one to look in the hidden corners of surfactant science and access material that is unavailable in reference books. To

those who need the information, finding it expertly compiled in one place is undoubtedly worth the nontrivial price.

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JA059708+

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Traceability in Chemical Measurement. Edited by Paul De Bièvre (Kasterlee, Belgium) and Helmut Günzler (Weinheim, Germany). Springer: Berlin, Heidelberg, New York. 2005. xii + 298 pp. $229.00. ISBN 3-540-43989-7.

This anthology features a collection of 56 papers on the topic of traceability as published in the journal *Accreditation and Quality Assurance* mostly during 2000−2003. To quote the preface, these articles "reflect the latest understanding of the concept 'measurement traceability' -or lack thereof- and possibly some rationale(s) for the answer to the question why it is important to integrate the concept of measurement traceability into the standard measurement procedures of every analytical laboratory." A sampling of some of the chapters includes "Whatcan we learn from traceability in physical measurements?", "Traceable measurement of pH", and "The role of reference materials in analytical chemistry". There is no index.

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