

BOOK REVIEWS

Bioanalytical Chemistry

Authors: Susan R. Mikkelsen and Eduardo Corton

Publisher: John Wiley & Sons, Inc.

ISBN: 0-471-54447-7

Price: \$94.95

Bioanalytical Chemistry authored by Susan R. Mikkelsen and Eduardo Corton is a book that will serve as text for advanced undergraduates and graduate students. This interdisciplinary book will also serve as a reference work for researchers, students, and industrial scientists working in chemistry, biology, biochemistry, pharmacy and medicine. This 361-page title has an index.

The authors review all aspects of using analytical methodology to solve biological problems and describe many of the techniques used by biochemists and molecular biologists. Each chapter begins with coverage of basic concepts and then progresses to applications that involve real samples and has problems and the explained answers are included in the appendix. The mathematical derivations are limited to those that are essential for an understanding of each method. Suggested readings and references are included for further information. Graphs, diagrams and structural formulas are included throughout the book.

Bioanalytical chemistry is divided into 16 chapters. Chapter one entitled "Spectroscopic Methods for Matrix Characterization" discusses total protein, total DNA, total RNA, total carbohydrate, and free fatty acids. Chapter two entitled "Enzymes" includes enzyme nomenclature, enzyme commission numbers, enzymes in bioanalytical chemistry, enzyme kinetic, enzyme activators, enzyme inhibitors, enzyme units and concentration. Chapter three entitled "Quantitation of Enzymes and Their Substrates" includes substrate depletion or product accumulation, direct and coupled measurements, instrumental methods (optical, electrochemical and other methods), ultra-high throughput assays (HTA) and practical considerations for enzymatic assays. Chapter four entitled " Immobilized Enzymes" presents immobilization methods, properties of immobilized enzymes, immobilized enzyme reactors and theoretical treatment of packed-bed enzyme reactors. Chapter five entitled "Antibodies" discusses structural and functional properties of antibodies, polyclonal and monoclonal antibodies, antibody-antigen interactions, and analytical applications of secondary antibody-antigen interactions (agglutination and precipitation). Chapter six entitled "Quantitative Immunoassays with Labels" discusses labeling reactions, heterogeneous immunoassays (labeled-antibody methods, labeled-ligand assays, radioisotopes, flurophores, chemiluminescent labels and enzyme labels) and homogeneous immunoassays (fluorescent labels and enzymes labels) and evaluation of new

immunoassay methods. Chapter seven entitled "Biosensors" discusses the response of enzyme-based biosensors, evaluation of biosensor performance and examples or biosensor configuration. Chapter eight entitled "Direct Evolution for the Design of Macromolecular Bioassay Reagents" presents rational design and directed evolution, generation of genetic diversity, linking genotype and phenotype, identification and selection of successful variant, and direct evolution of galactose oxidase. Chapter nine entitled "Electrophoresis" presents electrophoretic support media, effect of experimental conditions on electrophoretic separations, and detection of proteins and nucleic acids after electrophoretic separation. Chapter ten is entitled Applications of Zone Electrophoresis". Chapter eleven is entitled "Isoelectric Focusing". Chapter twelve is entitled "Capillary Electrophoresis". Chapter thirteen entitled "Centrifugation Methods" discusses forces, gradients, techniques and examples. Chapter fourteen entitled "Chromatography of Biomolecules" includes units, definitions, plate theory, rate theory, size exclusion (gel filtration), affinity and ion-exchange chromatography. Chapter fifteen entitled " Mass Spectrometry of Biomolecules" discusses instrumentation, interpretation, protein identification, protein-peptide sequencing, nucleic acid applications, bacterial applications and biomolecular weight determinations. Chapter sixteen entitled "Validation of New Bioanalytical Methods" includes mean, variance, estimators or precision and accuracy figures of merit and examples.

Submitted by: Anne T. Sherren, PhD, FAIC



Principles and Applications of Ion Scattering Spectrometry

Editors: J. Wayne Rabalais

Publisher: John Wiley & Sons, Inc.

ISBN: 0-471-20277-0

Price: \$99.95

Principles and applications of Ion Scattering Spectrometry authored by J. Wayne Rabalais is a book that will serve as an invaluable resource for a wide audience - research scientists, students and technicians. This authoritative account will also serve as a textbook for graduate courses. This monograph authored by the leading researcher in the field merges theoretical fundamentals and cutting-edge practical applications. The first chapters are written for advanced undergraduates and graduate students and the latter chapters cover applications and cutting edge research. This book is part of the Wiley-Interscience Series on Mass Spectrometry. Each chapter includes references specific to that chapter. There are many diagrams and figures in each chapter. The book has an index and is 306 pages in length.

The book is divided into ten chapters. Chapter one entitled "Introduction" discusses ion scattering spectrometry, the importance of surfaces, ion-surface interactions, the historical development of ion scattering spectrometry, other types of ion spectrometries and features of ion scattering spectra. Chapter two entitled "Theoretical Descriptions of Atomic Collisions" includes the Kinematics and dynamics of atomic collisions and multiple collisions. Chapter three entitled "Experimental Methods" includes a general description of an ion-scattering spectrometer system (including the components. Also included in this chapter are discussions of a time-of-flight scattering and recoiling spectrometer, a coaxial scattering spectrometer, a scattering and recoiling imaging spectrometer, mass and charge selection of pulsed ion beams using sequential deflection pulses and ion scattering and recoiling from liquid surfaces. Chapter four entitled " General Features of Ion Scattering and Recoiling Spectra discusses energy spectra, time-of-flight spectra (interpretation, intensities, sensitivity and examples of TOF spectra), recoiling spectra without scattering spectra, sampling depth, attributes of the ion-scattering technique and a comparison to other surface elemental analysis. The methods compared include diffraction methods, high-energy ion scattering, helium atom scattering, scanning microscopy, electron scattering and ionization and bonding-breaking techniques. Chapter five entitled "Structural Analysis from Time-of-Flight Scattering and Recoiling Spectrometry" includes atomic collisions in the keV range, structural analysis, azimuthal alignment of the incident ion beam, TOF-SARS and LEED. Chapter six entitled "Real Surface Crystallography form Scattering and Recoiling Imaging Spectrometry (SARIS) includes the details of the technique, interpretation of the SARISgrams, quantitative analysis of the SARIS images and the advantages of SARIS. Chapter seven discusses the applications of TOF-SARIS and SARIS to Surface Structure Analysis. Areas included are clean surface reconstruction and relaxation, hydrogen surfaces, oxygen surfaces, metal oxide surfaces, organic molecules on surfaces, semiconductor surfaces and epilayers on nickel. Chapter eight presents the process and examples of Ion-Surface Charge Exchange and Inelastic Energy Losses. Chapter nine discusses hyperthermal reactive ion scattering for molecular analysis of surfaces. Chapter ten is a bibliography of ion scattering publications.

Submitted by: Anne T. Sherren, PhD, FAIC



Modern Practice of Gas Chromatography, 4th Edition

Author: Robert L. Grob and Eugene F. Berry

Publisher: John Wiley & Sons, Inc.

ISBN#: 0-471-22983-0

Price of Book: \$150.00

Modern Practice of Gas Chromatography, 4th Edition by Robert L. Grob and Eugene F. Berry is a thorough treatment of the subject of gas chromatography. Each chapter of this volume is written by expert in the particular field of gas chromatography. A suitable quote introduces each chapter of the book. This title is suitable for a textbook for university courses, workshop book, or a guide for the practicing chemists analysts, analytical chemists, technicians or scientists. In some ways this volume is the bible of gas chromatography—offering everything the professional and the novice need to know about running, maintaining, and interpreting the results from GC. Analytical chemists, technicians, and scientists in allied disciplines have come to regard Modern Practice of Gas Chromatography as the standard reference in gas chromatography, the fourth edition will be no exception. In addition to serving as an invaluable reference for the experienced practitioner, this best selling work provides the beginner with a solid understanding of gas chromatographic theory and basic techniques. This new Fourth Edition incorporates the most recent developments in the field, including entirely new chapters on gas chromatography/mass spectrometry (GC/MS); optimization of separations and computer assistance; high speed or fast gas chromatography; mobile phase requirements: gas system requirements and sample preparation techniques; qualitative and quantitative analysis by GC; updated information on detectors; validation and QA/QC of chromatographic methods; and useful hints for good gas chromatography. The book is written in a fashion that is easy to understand by novice and experienced chromatographers. The chapters include wonderful details about mechanism of separations, valuable information on flash vaporization process, and the utilities of the various detectors. This book is comprehensive and comprehensible. This volume has a good balance of theoretical explanation, and also inclusion of commercially available technology. Each chapter has many references, adequate figures, graphs and pictures.

The book is presented in four sections. Chapter one is the Introduction. Part I – Theory and Basics includes four chapters. The four chapters are entitled: “Theory of Gas Chromatography;” “Columns: Packed and Capillary; Column selection in Gas Chromatography;” “Optimization of Separations and Computer Assistance;” and “High Speed Gas Chromatography.” Part II – Techniques and Instrumentation has five chapters. The five chapters are entitled “Detectors in Modern Gas Chromatography;” “Techniques for Gas Chromatography/Mass Spectrometry;” “Qualitative and Quantitative Analysis by Gas Chromatography;” “Inlet Systems for Gas Chromatography;” and “Gas Management Systems for Gas Chromatography.” Part III – Applications has seven chapters. The seven

chapters are entitled "Simple Preparation Techniques for Gas Chromatography;" "Physicochemical Measurements by Chromatography;" "Petroleum and Petrochemical Analysis by Gas Chromatography;" "Clinical and Pharmaceutical Analysis by Gas Chromatography;" "Environmental Chromatography;" "Forensic Science of Applications of Gas Science Applications of Gas Chromatography;" and "Validation and QA/QC of Gas Chromatographic Methods."

Part 4 - Appendices includes 3 appendixes and an index. Appendix A - "Effect of Detector Attenuation Change and Chart Speed on Peak Height, Peak Width and Peak Area." Appendix B - "Gas Chromatographic Acronyms and Symbols and Their Definitions." Appendix C - Useful Hints for Gas Chromatography."

Submitted by: Anne T. Sherren, PhD, FAIC



Inorganic Chemistry Highlights

Editor: Gerd Meyer, Dieter Naumann, Lars Wesemann

Publisher: John Wiley & Sons, Inc.

ISBN#: 3-527-30265-4

Price of Book: \$90.00

Inorganic Chemistry Highlights edited by Meyer, Naumann and Wesemann is a book for the person looking for an insight in the inorganic world beyond the person's specific research area. The publishers hope that this will be volume one of a series for inorganic chemists similar to the series Organic Synthesis Highlights. The editors stress that this collection of highlights by no means covers the entire wealth of inorganic chemistry. This book contains nineteen chapters each written by a different specialist or group of specialists. Each chapter begins with an introduction and contains many figures and diagrams. Each chapter has a reference section at the end of the chapter. The book has a subject index and is 324 pages in length.

Chapter one entitled *Molten Zintl Alloys* has eight sections. Chapter 2 entitled *Structure and Bonding Around the Zintl Border* contains six sections. Chapter three entitled *Structure Prediction and Determination of Crystalline Compounds* contains five sections. Chapter 4 entitled *Multivalent Cation Conductors* contains five sections. Chapter five is entitled *The Potential of Pentagonal Building Blocks from Giant Ring-shaped to Spherical Polyoxometalate Clusters*. Chapter six with three sections is entitled *Molybdenum Peroxo Complexes as Catalysts in Olefin Epoxidation*. Chapter seven is entitled *Syntheses of Rare Earth Organometallics*,

Organo amides, and Aryloxides from the Metals. It contains three sections. Chapter eight entitled *Enzyme Structure: Active Site Structural and Functional Aspects of Purple Acid Phosphatase and Catechol Oxidase* and has three sections. Chapter nine entitled *Aminotroponimines as Ligands for Group 3 and Lanthanide Complexes - Coordination Chemistry and Catalysis* has four sections. Chapter ten entitled *Metalla-calix[4]arenes: How they Assist the Transformations of Hydrocarbons into Metalla-alkylidenes, of Dinitrogen into Metalla-nitrides, and of Carbon Monoxide into Metalla-carbides* has four sections. Chapter eleven is entitled *Metal Carbonyl Cations and their Derivatives - A New Class of Superelectrophiles*. Chapter twelve entitled *Borylene Complexes* has three sections. Chapter thirteen is entitled *Silaboranes*. Chapter fourteen entitled *Carbaalanes - A New Class of Compounds Containing Clusters of Aluminium and Carbon Atoms* has seven sections. Chapter 15 entitled *Molecular Aluminum and Gallium Subhalides* has four sections. Chapter sixteen entitled *Recent Developments in the Chemistry of Covalent Main Group Azides* has seven sections. Chapter seventeen is entitled *Silacalix-[n]-phosphinines: sp²-phosphorus Equivalents of CO Matrices*. Chapter 18 entitled *Dinitrogen as a Raw Material: Is there a Future?* has six sections. Chapter nineteen entitled *Organoxenon Compounds* has five sections. Upon examination of the topics one realizes that a wide breadth of inorganic chemistry is covered in the Highlight volume.

Submitted by: Anne T. Sherren, PhD, FAIC



Multidimensional Chromatography

Editors: Luigi Mondello, Alastair C. Lewis, Keith D. Bartle

Publisher: John Wiley & Sons, Inc.

ISBN#: 0-471-98869-3

Price of Book: \$140.00

Multidimensional Chromatography authored by Luigi Mondello, Alastair C. Lewis, Keith D. Bartle is a book that will serve as an invaluable resource for a wide audience - research scientists and technicians. This volume will also serve as a textbook for graduate courses. This monograph, edited by pioneers in the field, is the first book to review all multidimensional techniques including LC-GC, GC-GC, and GC- Supercritical Fluid Chromatography. Separation Science is a mature and unified subject in which now conventional chromatographic and electrically driven processes are applied in the analysis of mixtures of compounds in a wide range of applications. As the boundaries between the distinct techniques becomes more blurred, it is becoming evident that a single theory may be

applicable to chromatography whatever the physical state of the mobile phase. The different techniques can be regarded as special cases of the same procedure. In many of the applications the chromatography is combined with electrophoresis. Each chapter includes references specific to that chapter. The book has an index and is 436 pages in length.

This book is divided into two parts - an introduction to the various techniques and applications for a number of types of samples. Part 1 is entitled "General" and has nine chapters. Chapter one entitled "Introduction" includes items related to packed capillary column and unified chromatography, the resolving power of chromatographic systems, two-dimensional separations and multidimensional chromatography. Chapter two entitled "Coupled High Performance Liquid Chromatography with High Resolution Gas Chromatography." The topics of transfer techniques, vaporization with hot injectors, transfer of water-containing solvent mixtures and the indirect introduction of water are discussed. Chapter three entitled "Multidimensional High Resolution Gas Chromatography". This chapter presents practical two-dimensional gas chromatography and some practical examples. Chapter four entitled "Orthogonal GC-GC." The subsections include introduction to multidimensional gas chromatography, introduction to GC x GC Separation, introduction to modular technology, orthogonality of analysis, quantitative aspects, future opportunities and challenges of GC x GC technology. Chapter five entitled "Coupled-Column Liquid Chromatography" presents theoretical aspects and LC-LC techniques. Chapter six entitled "Supercritical Fluid Techniques Coupled with Chromatographic Techniques" discusses on-line coupling of Super Fluid Extraction (SFE) with chromatographic techniques, on-line coupling of Super Fluid Extraction (SFE) with capillary electrodriven separation techniques, and multidimensional to unified chromatography passing through supercritical fluids. Chapter seven entitled " Unified Chromatography: Concepts and Considerations for Multidimensional Chromatography" discusses the instrumentation, a phase diagram view, advantages and challenges for unified chromatography techniques in multidimensional systems and the column efficiency and plate heights in Unified chromatography. Chapter eight entitled "Multidimensional Planar Chromatography" discusses two-dimensional or multidimensional planar chromatography, coupling of techniques, and multiple directions. Chapter nine entitled "Multidimensional Electrodriven Separations" discusses many aspects of multidimensional electrokinetic separations. Part two entitled "Applications" has six chapters. Each of the chapters discusses applications for a specific type of sample or industry. The types of samples presented include: foods, flavors and fragrances; biomedical and pharmaceutical; industrial and polymers; environmental; oil; and forensic and toxicological applications. *Reviewed by Anne Sherren, Ph.D., FAIC*

Submitted by: Anne T. Sherren, PhD, FAIC



The Raman Effect: A Unified Treatment of the Theory of Raman Scattering by Molecules

Author: Derek A. Long

Publisher: John Wiley & Sons

ISBN#: 0-471-49028-8

Price of Book: \$296.00

The Raman Effect: A Unified Treatment of the Theory of Raman Scattering by Molecules by Derek A. Long presents a unified theoretical treatment, which is complete and rigorous but never the less readable. The systems treated are limited to scattering by systems of freely orienting, non-interacting molecules, or systems that approximate them. The necessary mathematical and physical tools are developed in appendices, and references made to them from the text. This volume is theoretical and mathematical. The theoretical treatment requires a variety of mathematical and physical tools. To keep the main text uncluttered, these tools are developed in comprehensive Appendices to which cross-references are made in the main text. These Appendices also ensure that the main text is useful to readers with a wide variety of scientific backgrounds and experience. These include not only spectroscopists, but also chemists, physicists, biochemists and analytical chemists. The presentation is such that postgraduate and postdoctoral students as well as more established research workers will find it valuable. One rarely finds a book of 597 pages that has 248 pages devoted to the Appendices. Part one is entitled "Theory." Each of the 10 chapters includes many diagrams, tables, and references. Chapter one is "Survey of Light-scattering Phenomena." Chapter two is "Introduction to Theoretical Treatments of incoherent Light Scattering." Chapter three is "Theory of Rayleigh and Raman Scattering." Chapter four is "Quantum Mechanical Theory of Rayleigh and Raman Scattering." Chapter 5 is "Vibrational Raman Scattering." Chapter six is "Rotational and Vibrational-Rotational Raman Scattering." Chapter seven is "Vibrational Resonance Raman Scattering." Chapter eight is "Rotational and Vibrational-Rotational Resonance Raman Scattering." Chapter nine is "Normal and Resonance Electronic and Vibrational Raman Scattering." Chapter ten is "Rayleigh and Raman Scattering by Chiral Systems." Part two is the Appendices. Each of the 21 appendices include and introduction definitions and formulae. The book is well cross-referenced and has an index.

The chemist seeking only those aspects of Raman theory and spectrum interpretation that bear directly on chemical analysis should consult *Raman Spectroscopy for Chemical Analysis, Volume 157 in Chemical Analysis* by Richard L McCreery and other volumes containing compendia of spectra and frequencies.

Submitted by: Anne T. Sherren, PhD, FAIC



Topics in Stereochemistry, Volume 23

Author: Scott E. Denmark, Editor

Publisher: John Wiley & Sons, Inc.

ISBN#: 0-471-17622-2

Price of Book: \$158.00

Topics in Stereochemistry, Volume 23, edited by Scott E. Denmark is one volume in the series *Topics in Stereochemistry* that first began in 1967. The field has grown and the impact that stereochemistry has impacted all reaches of the chemical enterprise. In addition to chemistry this topic is important for biology, medicine, physics, materials science, chemical engineering, and environmental science. The book has a subject index, cumulative author index for all 23 volumes and a cumulative title index for all 23 volumes. The length of the book is 369 pages.

The book is divided into five sections. Each of the five sections is authored by individuals expert to that field. Each section begins with an introduction and includes numerous figures, structures, and references. Section one is entitled "Chirality in Fullerene Chemistry". Topics presented include: configurational description of chiral fullerenes and fullerene derivatives with a chiral functional group; inherently chiral fullerenes; chiral fullerene derivatives. Section two is entitled "Transition-Metal-Templated Synthesis of Rotaxanes. Topics included are: general aspects of rotaxane, transition-metal-templated-synthesis; transition-metal-controlled threading-a new principle of rotaxane synthesis; and functional rotaxanes. Section three is entitled "Memory of Chirality: Asymmetric Induction Based on the Dynamic Chirality of Enolates". Topics included are: memory of chirality; asymmetric synthesis via enolate intermediates; dynamic chirality; designed memory of chirality in alkylation of a ketone; direct asymmetric α -alkylation of phenylalanine derivatives; asymmetric α -methylation of various α -amino acid derivatives; mechanism of memory of chirality in asymmetric methylation of α -amino acid derivatives; memory of chirality in diastereoselective α -alkylation of β -branched α -amino acid derivatives; memory of chirality in the literature; perspectives and conclusions. Section four is entitled "Chiral Discrimination during Crystallization". Topics presented include: chiral discrimination phenomena during crystallization; molecular design of novel nonnatural resolving agents in diastereometric resolution (acidic and basic agents); and chiral discrimination of racemates by conventional resolving agents. Section five is entitled "Asymmetric Aldol Reactions Using Aldolases. The asymmetric reactions include: DHAP-dependent aldolases; pyruvate and

phosphoenolpyruvate –dependent aldolases; 2- deoxyribose-5phosphate aldolases; glycine- dependent aldolases; transketolase; transaldolase; and aldolase catalytic antibodies.

Submitted by: Anne T. Sherren, PhD, FAIC

