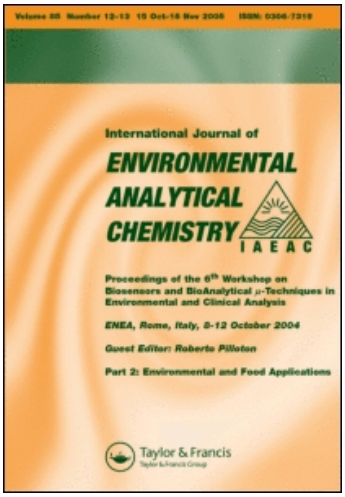

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Book reviews

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Book reviews

INSTRUMENTAL METHODS IN METAL SPECIATION, edited by I. Ali and H.Y. Aboul-Enein, 349 pages, CRC Press, Taylor & Francis, Boca Raton, FL (2006), ISBN 0-8493-3736-4, £92.00.

Knowledge of metal-ion speciation is essential for assessing the fate and toxicity of metals in the environment. This book provides a comprehensive overview on analytical techniques and experimental methodologies for determining the concentration of the different physicochemical forms of metal ions in environmental and biological samples, leading to more accurate measurements of actual toxicity. The authors introduce the principles of metal ion speciation and present a range of gas- and liquid-chromatographic approaches, including capillary electrochromatography and high-performance, ion, ion-pair, micellar electrokinetic, size exclusion, chiral, and supercritical fluid chromatographies for all metal-ion species as well as electrochemical and radiochemical methods. Comprehensive in scope, the text covers the sources, distribution, toxicity, biotransformation, and biodegradation of each metal ion species as well as extraction methods, sample preparation, and experimental optimization techniques that can be useful in designing future experiments. Finally, it describes the perspectives of metal-ion speciation in risk assessment and legislation.

Instrumental Methods in Metal Ion Speciation is a unique and valuable source of reference for scientists, academics, and graduate students working in the field of metal-ion speciation within the areas of analytical, biological, pharmaceutical, and environmental chemistries, as well as geochemistry, agriculture, biotechnology, and occupational safety. This book also fulfils the requirements of regulatory authorities in controlling the distribution of different metal-ion species in the environment and living organisms.

IMMUNOASSAY AND OTHER BIOANALYTICAL TECHNIQUES, edited by J.M. Van Emon, 512 pages, CRC Press, Taylor & Francis, Boca Raton, FL (2006), ISBN 0-8493-3942-1, £85.00.

Today, immunochemical methods are part of a growing cadre of bioanalytical methods for compounds of environmental and biological significance such as pesticides, biomarkers, genetically modified organisms, prions, and heavy metals. These methods are being applied to environmental monitoring and human-exposure assessment studies, and homeland-security measures. This excellent book informs analytical chemists about the strengths and versatility of immunochemical and biosensor methods for a wide spectrum of environmental and biological measurement applications. Chapters review the techniques used to generate and characterize antibodies and

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molecular imprints, and describe how they may be formulated into field portable assays. They also contain an updated analysis of the literature protocols and methods routinely used for the development of diagnostic and detection probes. Readers who are already experienced analysts employing immunoassay methods will find a selection of readings describing other areas of applied bioanalytical research. The authors present established and innovative uses of bioanalytical methods as well as data analysis and quality-assurance guidelines. Insights into recently developed technologies and procedures can be found in later chapters. The field is rapidly expanding, and dates on breakthrough research are also presented, including the impact of nanotechnology.

As described in this reference work, bioanalysis is rapidly advancing in many areas such as engineering and generating specific antibodies and the development of antibody mimics and other receptors, microarrays, improved detection systems, immunoaffinity sample preparations, multiplexed immunoassays, and sensors for unattended and real-time analysis. It is hoped that this book will recruit additional practitioners of traditional analytical chemistry into the diverse field of analytical method research.

In summary, the book provides both a basic understanding of immunochemical and other bioanalytical methods and an update on important technological advances such as new platforms and detection systems. Therefore, it should be a reference for students as well as practising analysts and an aid for bioanalytical methods development and application.

ASSIGNING STRUCTURES TO IONS IN MASS SPECTROMETRY, by J.L. Holmes, C. Aubry and P.M. Mayer, 446 pages, CRC Press, Taylor & Francis Group, Boca Raton, FL (2007), ISBN 0-8493-1950-1, £92.00.

This book provides the background material essential for the proper interpretation and understanding of organic mass spectra. It is therefore important for users of the method, especially those analytical scientists for whom mass spectrometry is a significant technique.

The book summarizes our present knowledge of the structures and chemistries of small organic cations (C to C in the gas phase). Chapter 1 briefly surveys current experimental methods for ion production and separation, followed by a more detailed presentation of the experiments designed to reveal qualitative and quantitative aspects of gas-phase ions. Emphasis is placed on those methods that are used to probe ion structures, namely, the determination of ionic heats of formation and generalities derived therefrom, controlled experiments on the dissociation characteristics of mass selected ions, and the reactivity of ions. Due to the increasingly important contribution of computational chemistry to the development of the field, a brief discussion of these methods and how to use them to advantage is also presented. Chapter 2 describes five selected case studies, namely the distonic ions (e.g. $CH_2\ ^+OH_2$), the McLafferty rearrangement, the peptide ion fragmentation (the structure of b-type ions), the methyl acetate ion story, and the thermochemistry of ions containing the peroxy function (ROOR′). They have been carefully chosen to present the reader with the type and range of difficulties associated with ion-structure assignment and thermochemical problems. In each case, sufficient data are presented and discussed, and how experiments and, when appropriate, molecular orbital theory calculations can be used to solve the problem. This chapter concludes with a brief guide as to the best way to assign a structure to a new ion and what pitfalls to avoid. The last and major section of

the book contains the data sufficient for the description and identification of all ions containing C alone and C with H, O, N, S, P, halogen, from C1 to C3 and is intended to be a primary source of such information.

INDUCTIVELY COUPLED PLASMA SPECTROMETRY AND ITS APPLICATIONS, edited by S.J. Hill, 427 pages, Blackwell Publishing, Oxford (2006), ISBN 1-405-13594-8, £99.50.

The first edition of this book was perceived as a handbook for users of inductively coupled plasmas (ICPs) who wanted a better understanding of the theory, yet also wanted a practical insight of how best to approach a range of applications. These key objectives have been retained in the second edition, but the focus of the book has changed so that the overall perspective is more forward-looking. The emphasis is now on state-of-the-art developments and potential future developments, providing a useful reference for those engaged in using ICPs to achieve their own scientific goals.

The book has been structured into 11 chapters, providing enough detail to be useful to both new and experienced users. The first chapter sets the scene for the rest of the book by providing a thought-provoking account of both the strengths and weaknesses of ICP-AES and ICP-MS, and how the impact of technology transfer is starting to affect current trends and may impact future developments. Chapter 2 looks at the fundamental principles of ICP including details of temperature measurement and recent studies employing solid-state detectors to acquire the entire UV-visible spectra for diagnostic studies. Chapter 3 introduces the basic concepts and requirements for precise and accurate practical measurement, and then overviews the instrumentation required for ICP-AES. There are sections on high-resolution spectrometry, microplasmas, and plasma on a chip technology. Chapter 4 looks in detail at sample introduction via liquid aerosol generation but also describes other forms of sample transport such as vapour-generation techniques, electrothermal vaporization, and solid sample laser ablation. In Chapter 5, the focus turns to ICP-MS, covering fundamental aspects such as ion sampling, mass analysers, and ion detection, prior to a more detailed consideration of the use of ICP-MS for isotope ratio measurements, including selected applications, in Chapter 6. In Chapter 7, alternative and mixed-gas plasma are discussed. The following chapter on electrospray ionization mass spectrometry offers an overview of this complementary technique for trace-metal speciation studies, particularly when there is a need to better characterize important complex metal containing species such as biomolecules. The last three chapters put all of the aboye into a practical context. These three chapters cover geological, environmental, and clinical applications together with a detailed account of plasma spectrometry in food science.

ATMOSPHERIC CHEMISTRY AND PHYSICS, FROM AIR POLLUTION TO CLIMATE CHANGE (2nd edition), by J.H. Seinfeld and S.N. Pandis, 1203 pages, Wiley-Interscience, Hoboken, NJ (2006), ISBN 0-471-72018-6, £67.95.

The important developments occurred in atmospheric science since 1998, when the book was first published, prompting this second edition. New chapters have been added on chemical kinetics, atmospheric radiation and photochemistry, global circulation of the atmosphere, and global biogeochemical cycles. The chapters on stratospheric and tropospheric chemistry and organic atmospheric aerosols have been revised to reflect the current state of understanding in this area.

The aim of the book is to provide a rigorous, comprehensive treatment of the chemistry of the atmosphere, including the formation, growth, dynamics, and properties of aerosols; the meteorology of air pollution; the transport, diffusion, and removal of species in the atmosphere; the formation and chemistry of clouds; the interaction of atmospheric chemistry and climate; the radiative and climatic effects of gases and particles; and the formulation of mathematical chemical/transport models of the atmosphere. Each of these elements is covered in detail from the first principles. Numerous examples and problems are included at the end of the chapters to enable the reader to evaluate their understanding of the material. In this way, the reader will gain a significant knowledge of the science underlying the description of atmospheric processes and will be able to extend theories and results beyond.

The book is intended to serve as a textbook for a course in atmospheric science as well as a comprehensive reference book for professionals and senior or first-year graduate level in traditional engineering and science disciplines.

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