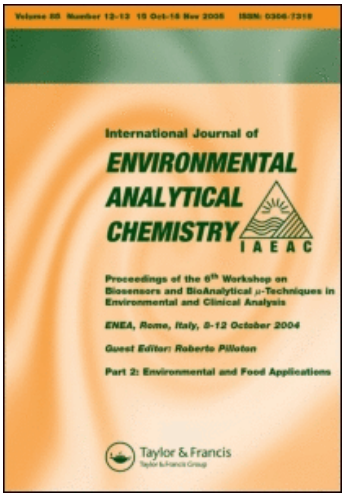

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Book Reviews

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BOOK REVIEWS

A Practical Approach to Quantitative Metal Analysis of Organic Matrices, by Martin C. Brennan. John Wiley & Sons, Chichester, UK (2008), 258 pp., £75.00, ISBN 978-0-470-03197-1.

In the last twenty years atomic spectroscopy has made significant advances, particularly with the introduction of new improved optic designs and detection methods. These improvements have led to superior resolution of the wavelengths of the excited atoms and detection techniques measuring lower levels of metals with ease. Particularly, inductively coupled plasma optical emission spectrometry (ICP-OES) has become an established technique in most laboratories analysing a wide range of sample matrices reporting accurate and precise results.

This book aims to cover the importance of metal analysis for a range of organic materials and provides an insight and, in some cases, an alternative approach to the analysis of organic matrices using ICP-OES. Special emphasis is given to sample preparation, an important and often overlooked topic in most books on atomic spectroscopy. The microwave acid digester, high pressure oxygen bomb combustion, preconcentration columns, rapid dry ashing or UV digester methods, and solvent extraction with complex reagents are the common sample preparation techniques used in modern laboratories that are discussed. In addition, it shows how to analyse some samples directly with the same level of detection and precision.

Topics covered include: A practical approach to quantitative metal analysis of organic matrices using ICP-OES; Instrumentations associated with atomic spectroscopy; Methodologies of metal analysis of organic matrices using ICP-OES; Analysis of plastics, fibres and textiles for metals content using ICP-OES; Metal analysis of virgin and crude petroleum products; Metal analysis of structural adhesives; Hyphenated and miscellaneous techniques used with ICP-OES.

Practitioners requiring multi-elemental analysis in industrial, environmental, pharmaceutical and research laboratories, where information on identification and quantification is required on a regular basis will find this book of considerable value. This text should find space on the shelves of academic, industrial and research departments.

Bioenergy, edited by Judy D. Wall, Caroline S. Harwood and Arnold Demain. ASM Press, Washington, DC (2008), 437 pp., ISBN 978-1-555813478-6, £90.00.

Developing renewable sources of fuels that are more nearly carbon-neutral and can replace the demand for declining fossil fuels is a must. No doubt, a single source of alternative energy is unlikely to meet all needs; thus, none can be ignored. Biomass derived from photosynthesis is one obvious source, and microbial conversions of biomass are already proving fruitful. This timely volume provides concise views of microbial conversions that lead to renewable fuel sources, and microbial activities sparing the use of non renewable resources.

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The book begins with 10 chapters on ethanol production from cellulosic materials, which is more economically feasible and sustainable than ethanol production from corn. These chapters are followed by discussions on the status of energy sources that are in various stages of development, including the production of methane, methanol, butanol and other solvents from biomass and other feedstocks. Interesting chapters are devoted to the microbiological production of hydrogen and electricity through engineered ecosystems as fuel cells. Microbes can also be useful for enhancing the recovery of methane and oil from old reservoirs. The last chapter deals with exploiting microbial genomes for biodiesel production.

A large number of experts currently engaged in the research (76) have contributed to the different chapters. Besides the current status of the different topics, they have laid down the foundations for future research. Therefore, the reader of these accounts of ongoing research will also find stimulating ideas to further contribute the major breakthroughs needed to make an impact in the field.

Handbook of GC/MS: Fundamentals and Applications, second, completely revised and updated edition, by Hans-Joachim Hübschmann. Wiley-VCH Verlag GmbH & Co, Weinheim, Germany (2009), 719 pp., ISBN 978-3-527-31427-0, EUR 135.00.

Mass spectrometry (MS) in hyphenation with gas or liquid chromatography (GC/or LC/MS) has become the success story in analytical instrumentation, covering a never expected wealth of applications, from daily routine quality control, to confirmatory analysis with legal impact.

The second edition of this Handbook accommodates the new trends in GC/MS with a significant revision and extension, covering emerging new techniques and referencing recent leading applications. The first section extensively describes the fundamentals of the technique, starting from sample preparation, where new pressurised fluid and online solid phase extractions have been added. New separation strategies with fast GC, multi-dimensional gas chromatography and column switching are also covered, both in the fundamental section as well as featuring important applications. High resolution and accurate mass analyser techniques, including time-of-flight and accurate mass quantifications using isotope dilution and lock mass techniques, are also described.

The second section, devoted to the evaluation of GC/MS analysis, reports on the interpretation of mass spectra, MS features of selected substance classes, and library search procedures, together with quantitation methods in complex matrix samples at the lowest limits.

GC/MS has expanded rapidly into new areas of application; therefore, these have received particular attention in the third section of the book. A number of new leading applications with a special focus on widely employed environmental, forensic and food safety examples, including isotope ratio mass spectrometry monitoring, are discussed. Special focus is laid on multi-component analysis methods for pesticides using fast GC and highly selective MS/MS methods. The strengths of automated and on-line SPE-GC/MS method are featured for contaminants from water using multidimensional GC. Other new SPME applications are demonstrated with the determination of polar aromatic amines and PBBs. Another focal point with the presentations of new key applications is the analysis of dioxins, PCBs and brominated flame retardants, with examples of the congener

specific analysis of technical mixtures, the application of fast GC methods and the isotope dilution quantitation for confirmatory analysis. A fast GC application using high resolution GC/MS for the European priority polyaromatic hydrocarbons is referenced. The identification and quantitation of toxins with the analysis of trichothecenes and other mycotoxins is covered as well as poisoning cases with the highly poisonous toxin ricin. An exciting extension of GC/MS to high boiling and polymer substances by analytical pyrolysis is described by the analysis of glycol and derivatives, the characterisation of natural waxes and the quantitative pyrolysis polymers. Finally the book, features a glossary of terms and a substance index that helps the reader to find information for their particular analytical problem.

This comprehensive compilation of up-to-date technical GC/MS fundamentals, operational know-how and practical application work, will be very useful for the daily GC/MS practitioner as well as for the introduction of beginners and students in this analytical technique. It should be present in every analytical chemistry department, as well as in food, environmental, pharmaceutical and clinical GC/MS laboratories.

Arsenic Contamination of Groundwater. Mechanism, Analysis, and Remediation, edited by Satinder Ahuja. John Wiley & Sons, Hoboken, NJ (2008), 387 pp., ISBN 978-0-470-14447-3, £88.50.

Arsenic contamination has been found in many areas of the globe, affecting more than 100 million people worldwide. Groundwater can be contaminated with arsenic from naturally occurring sources, difficult to control. The book has been planned to improve our understanding of this terrible problem and offers some meaningful solutions. Chapter 1 provides a broad overview of the problem. Accumulation of arsenic in various crops that are irrigated with arsenic-rich water and its consequences on dietary intake are covered in Chapter 2. Various remedial measures to combat arsenic accumulation in soils and crops are also discussed. A large number of studies that have been conducted in Asia, the United States, and the United Kingdom to improve our understanding of the mechanism of groundwater contamination, covered in Chapters 3 to 6, favour the microbial processes.

The development of low-cost analytical methods and reliable field test kits for measuring arsenic in water down to ultratrace levels are described in Chapters 7 and 8.

A large number of approaches have been investigated for removing arsenic from drinking water. The basic chemistry for these processes is discussed in Chapters 9 to 14. A number of remediation methods that utilise natural or relatively inexpensive materials to purify the water have been discussed. Finally, potential solutions to this devastating problem are provided in Chapter 15.

This book will be of interest to numerous scientists working in the field of geochemistry, hydrology, analytical chemistry, environmental chemistry and engineering, and separation science and technology. Academic and regulatory personnel working in these fields, along with aid agencies (WHO, World Bank, UNICEF, etc.) and nongovernmental organisations are also likely to find a lot of significant information of interest to them. Furthermore, it is anticipated that this book will encourage scientists, environmentalists, engineers, and other well-wishers to rise to the occasion and explore the interesting science involved in the mechanism of arsenic contamination, develop low-priced instrumentation for analysis, and find suitable methods for remediation of the problem.

Ultrasound in Chemistry. Analytical Applications, edited by José-Luis Capelo-Martínez. Wiley-VCH Verlag GmbH & Co., Weinheim, Germany (2009), 157 pp., ISBN 975-3-527-31934-3, EUR 105.00.

This book is intended to serve as a laboratory guide in that it addresses the more practical aspects of the subject, reflecting the most important applications of ultrasound for sample treatment reported in the literature to date. Chapter 1 reviews the ultrasonic devices available nowadays to perform sample treatment for chemical analysis. Chapter 2 is devoted to applications of ultrasound for the extraction and determination of elements, including element speciation, in a wide variety of matrices, whilst Chapter 3 is dedicated to the extraction for the analysis of organic compounds by chromatographic techniques, including on-line applications. Chapter 4 covers the different uses of ultrasound in analytical electrochemistry. Chapter 5 is dedicated to the acceleration of sample treatments of one growing area in analytical chemistry proteomics – this is one of the most recent applications of ultrasonic energy. Finally, Chapter 6 deals with further applications of ultrasonic energy, not only in analytical chemistry but in the general chemistry arena, like the synthesis of organic molecules and inorganic nanomaterials and in polymer science.

This text will be useful for the implementation of analytical procedures in the laboratory but also in suggesting new applications and areas of research. Therefore, it should be of interest to researchers in academia and industry, as well as to analytical and natural products chemists and those working in trace analysis.

Environmental Futures: the Practice of Environmental Scenario Analysis, edited by Joseph Alcamo. Elsevier, Amsterdam, NL (2008), 197 pp., ISBN 978-0-444-53293-0, EUR 125.00.

Since the 1990s scientists and stakeholders have been working together on a series of wide-ranging international scenario exercises confronting the question of future changes in the global environment. Indeed, the number and importance of these exercises suggest that we are in a kind of golden era of global scenarios. But not only has the global scale earned the attention of scenario developers. For decades many other groups have been developing environmental scenarios on the local, regional and national scales. Rather than examining the scenarios themselves, this book describes the process for developing them and assesses their deficiencies with the aim of improving the methodologies and make them even more useful for examining future changes in society and the natural environment.

The following topics are covered by different chapters: Chapter 1 describes the two main threads of current scenario practice in environmental research and policy and the challenges they face. Chapter 2 is a synthesis chapter which aims to increase the rigor in environmental scenario analysis by systematically laying out definitions, procedures and methods, and by ordering methods used by many different practitioners. This chapter includes among other topics a discussion of proposed criteria for evaluating scenarios. Chapter 3 'A Survey of Environmental Scenarios' presents an overview of the rich and diverse range of environmental scenarios and serves as a kind of access guide for readers wishing to find out more about the details of different scenarios. Moreover this chapter presents a framework for understanding the different types and uses of environmental scenarios. Chapter 4 'Searching for the Future of Land' delves into an important and comprehensive type of environmental scenario, namely land use scenarios. Chapter 5

'Participation in Building Environmental Scenarios' lays out the rationale and possibilities for increasing the engagement of scenario users in developing scenarios. Throughout this book the case is made that an intense engagement of end users is both desirable and possible in a scenario exercise and is essential for scenarios to gain legitimacy and credibility in the policy community. Chapter 6 points out specific ways for exploiting the advantages of both narrative and numerical scenarios in a single exercise, with the aim to better serve the needs of both science and policy. Chapter 7 'Scale Issues in Environmental Scenario Development' addresses the key scientific and policy problem of how to incorporate the many scales of environmental phenomena in a scenario analysis. Chapter 8 confronts the issue of creativity and surprise in scenarios. How can scenarios be informative and surprising and be scientifically valid at the same time?

The book is mainly addressed to environmental specialists in local, national, and international agencies or planning offices, but also can be of interest to university-level students in environmental study programmes, and in city and regional planning programmes.

Advances in Flow Injection Analysis and Related Techniques, edited by Spas D. Kolev and Ian D. McKelvie. Elsevier, Amsterdam, NL (2008), 784 pp., ISBN 978-0-444-53094-3, EUR 195.00.

Flow injection analysis (FIA) has already an extensive history in the field of analytical chemistry. Some dozen books on various aspects of flow injection analysis have been published since the first edition of Ruzicka and Hansen's *Flow Injection Analysis* in 1981, but the last ones appeared over a decade ago. As a dynamic methodology, much has happened during the intervening years, and the FIA and related literature has exploded in the past decade. New developments have advanced the state-of-the-art of flow injection-based techniques, in instrumentation, in new modes, in sample handling, in detection, and in expanded applications. This volume is designed to give the reader a comprehensive, in depth, and up-to-date coverage of all aspects of the technique, from the basics to the different fields of application.

The book is divided into four main parts: Introduction to flow analysis, On-line sample manipulation, Detection, and Applications. Each part contains several chapters contributed by recognised experts in the field, which makes the book a unique and useful resource for the analytical chemistry community worldwide.

The introductory section includes an historical perspective of the technique, the principles, and information on databases for extracting literature of interest. Part two provide overviews on on-line sample pretreatment, membrane based separation techniques, chromatographic separations, including capillary electrophoresis. Part three on Detection covers photometry, luminescence, atomic spectroscopy, vibrational spectrometry and electrochemistry among other topics. The chapters on applications show a great variety of fields where the technique has been successfully applied, from food and beverages to life sciences, bioprocess and pharmaceutical analysis, industrial and process analysis, and environmental analysis.

The book is suitable for a wide audience, from students at the graduate level to experienced researchers and laboratory personnel in academia, industry and government.

The Water Framework Directive. Ecological and Chemical Status Monitoring, edited by Philippe Quevauviller, Ulrich Borchers, U. Clive Thompson and Tristan Simonart. John Wiley & Sons, Chichester, UK (2008), 476 pp., ISBN 978-0-470-51836-6, £135.00.

The EU Water Framework Directive (2000160/EC) is probably the most significant legislative instrument in the water field that was introduced on an international basis for many years. It moves towards integrated environmental management focussed on water as it flows through river basins to the sea, and its provisions apply to all waters – inland surface waters, ground waters, transitional (estuarine) and coastal waters – with key objectives to prevent any further deterioration of water bodies, and protect and enhance the status of aquatic ecosystems and associated wetlands.

Linked to the WFD objectives are a series of milestones that have to be complied with, including monitoring programmes. The present book provides an analysis of various monitoring features of the WFD, based on the contributions from different authors. In particular, general monitoring aspects are discussed, as well as case studies concerning different aquatic environments such as lakes, rivers, groundwaters, and coastal and marine waters. The book also contains sections on analytical tools in support of WFD monitoring (including modelling), and detailed aspects of groundwater and sediment monitoring. Finally, risk assessment linked to monitoring as well as data quality and reporting requirements are discussed. The book concludes with discussions about the need for an operational science-policy mechanism and about current activities and perspectives in the context of EU RTD programmes.

The widescale gathering of monitoring data will be of obvious interest to policy implementers and the practitioners, including the scientific community, industry and environmental NGOs.

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