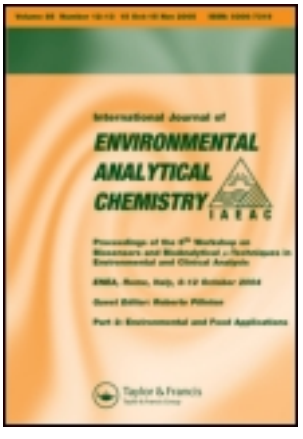

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Book Reviews

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BOOK REVIEWS

Organic Indoor Air Pollutants. Occurrence, Measurement, Evaluation, 2nd completely revised edn, edited by Tunga Salthammer and Erik Uhde, Weinheim, Germany, Wiley-VCH Verlag GmbH & Co. KGaA, 2009, 438 pp., EUR 149.00, ISBN 978-3-527-31267-2

Indoor quality is an important determinant of health and well-being. To assess it, the understanding of indoor air pollution mechanisms and the use of analytical methods for measuring air chemical pollutants are essential. This completely revised edition includes 12 new chapters addressing both chemical and analytical aspects of indoor organic pollutants.

The book emphasises a holistic and multidisciplinary approach towards indoor environment and is divided into four clearly defined parts: measuring organic indoor pollutants; investigation concepts and quality guidelines; field studies; and emission studies. In the first part, the authors cover physico-chemical fundamentals of organic pollutants, application of solid sorbents for the sampling of volatile organic compounds (VOCs), semi-VOCs and particulate organic matter in indoor air, application of diffusive samplers, real-time monitoring of indoor organic compounds, environmental test chambers and cells. Investigation concepts and quality guidelines are covered in the second part, including standardised methods for testing emissions of organic vapours from building products to indoor air, and material and indoor odours and odorants. Field studies for various indoor environments are described, such as automobile interiors, museum environments, or rooms with air ventilation. Two contributions are concerned with the effects on human health of VOCs and SVOCs as regards to exposure and the identification of guide values. Finally, emission sources covered include household and consumer products as well as electronic devices and office equipment.

The book provides the reader with a clear introduction to an important area of indoor air research. It will serve as a useful guide for chemists, physicists, biologists and medical doctors at universities and research facilities, in industry and environmental laboratories, as well as regulative bodies.

Risk Analysis of Water Pollution, 2nd revised and expanded edn by Jacques Ganoulis, Weinheim, Germany, Wiley-VCH Verlag GmbH & Co. KGaA, 2009, 311 pp., EUR 132.00, ISBN 978-3-527-32173-5

Risk and reliability is still a relatively new subject as applied to water resources and environmental engineering. This practice-oriented textbook is a unique tool for identifying local and regional environmental impacts on groundwater, river water and coastal areas from wastewater disposal and evaluating alternative water resources management plans. The book explains different risk-based probabilistic methodologies and fuzzy logic-based approaches and includes various mathematical models for water quality simulation and theories, such as the decision analysis, the utility theory and the integrated risk-based multi-criteria assessment and management, in order to thoroughly evaluate several case studies from the real world.

The risk identification process that includes the identification of the most significant loads, parameters and boundary conditions of the problem, together with uncertainties

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which may give rise to a risk of environmental threat, is analysed in Chapter 2. Two methodologies have been developed so far for uncertainty analysis, namely the probabilistic approach and the fuzzy set theory. Basic concepts and the main rules for stochastic and fuzzy calculus are presented in this chapter, together with illustrative examples mainly taken from water quality and water pollution applications.

Methods and techniques to quantify risks, not only in water resources but in a broader area of engineering, are presented in Chapter 3. In this chapter, 'loads' and 'resistances' are described either as stochastic or as fuzzy variables. With the exception of some simple cases, where direct calculation of risk is possible, the environmental system is usually modelled by means of either the stochastic or the fuzzy set approach.

Chapter 4 deals more specifically with the risk assessment of water pollution. The assessment of pollution risks in coastal, river and aquifer systems is analysed by appropriate mathematical modelling, describing transport, dispersion and physico-chemical reactions of the pollutants. To quantify uncertainties due to different variabilities such as advection, dispersion and initial conditions the random walk simulation is used. Chapter 5 deals with risk management. Here the risks have been identified and, as far as possible, quantified. Various criteria are defined to characterise risk, including performance indices related to the effects of uncertainty. Some of these criteria may be probabilistic or fuzzy.

A very important demonstration of how risk analysis can be useful when facing new and challenging problems, such as the implications in engineering works from possible coastal pollution and eutrophication due to climate change, is given in Chapter 6, with the case of the Gulf of Thermaikos (Macedonia, Greece).

Questions and numerical exercises testing the reader's understanding are given at the end of each chapter, and a useful appendix provides hints for answering them as well the solutions themselves.

This book may be of interest to engineers (civil, chemical and environmental), hydrologists, chemists, biologists, graduate students, researchers and professionals working on the issues of environmental water quality.

Quantification in LC and GC. A Practical Guide to Good Chromatographic Data, edited by Hans-Joachim Kuss and Stavros Kromidas, Weinheim, Germany, Wiley-VCH Verlag GmbH & Co. KGaA, 2009, 358 pp., EUR 89.00, ISBN 978-3-527-32301-2

Closing a gap in the current literature by addressing the evaluation and quality assessment of raw data, this practice-oriented guide is clearly divided into three parts. The first on *Evaluation and Estimation of Chromatographic Data* shows how chromatographic data are obtained and how the results are evaluated. In Chapter 1 there is a description of how a chromatogram arises and which factors influence the shape, the height and the area of the peaks. In Chapter 2 the integration parameters are explained: what do they mean and what are they called in different integration systems? Chapter 3 deals mainly with the integration and integration errors. Chapter 4 treats the simulation of exponential modified Gaussian (EMG) peaks and gives the theoretical background for peaks in gradient HPLC. Chapter 5 describes the special difficulties of the integration of asymmetric (EMG)-peaks. Chapter 6 treats the possibility of 'recalculating' merged peaks with the deconvolution method. Chapter 7 treats the calculations for evaluation and calibration, including weighted calibration. The general criteria for the judgement of analytical data are introduced

systematically and analysed critically in Chapter 8. Most of the chromatograms and/or tables in Chapters 3 to 8 can be found on a supplementary CD. Each time a remark such as 'Chromatogram.cdf' or 'Table.xls' is found in the text, the corresponding files can be found on the CD. Using them one can test one's own data system. Part one concludes with Chapter 9 which considers the metrological aspects of analytical data together with a detailed discussion of the measuring uncertainty.

Part two systematically covers the most important chromatographic methods as well as the specific requirements for obtaining good chromatographic data. An overview is given of some special conditions for: Gas chromatography in Chapter 10, LCMS coupling in Chapter 11, ion chromatography in Chapter 12 and gel permeation chromatography in Chapter 13.

The final part looks at data quality from the perspective of those regulatory authorities demanding certain standards in data quality, describing in detail best practices. The area regulated most strongly is certainly the pharmaceutical one. The requirements are explained from three different viewpoints: the US guidelines in Chapter 14; the EU guidelines in Chapter 15; and the view of the pharmaceutical industry in Chapter 16. Instead of an epilogue, the everyday dealing with analysis results is discussed in the final Chapter 17.

Written with the practitioner in mind, the text not only teaches the mathematical basics but also provides invaluable advice. On the one hand, it is the aim of the book to show that one perhaps should not always blindly trust integration systems and that it is worth while developing a deeper appreciation of integrating. On the other hand, it is intended to make a contribution to the critical analysis of chromatographic results, primarily for quantitative statements used as a basis for decisions. It is hoped the reader will discover many suggestions and ideas for ruling his own 'right' evaluation and assessment practice.

The Aral Sea Environment, edited by Andrey G. Kostanoy and Aleksey N. Kosarev, The Handbook of Environmental Chemistry, Volume 7, 332 pp., Heidelberg, Germany: Springer-Verlag GmbH, 2010, EUR 249.00, ISBN 978-3-540-88276-3

This book may be regarded as a follow-up to the previous editor's publications on other two threatened aquatic ecosystems 'The Caspian Sea Environment' (2005) and 'The Black Sea Environment' (2008) (see IJEAC, **86**, 1179, 2006 and **88**, 673, 2008). This unique volume presents the information gathered to date on various aspects of the Aral Sea environment, including a wide range of issues describing the remote past of the region as well as the recent tragic history of the evolution of the sea, and the present state of the Aral Sea environment. The evolution and present characteristics of physical oceanography, marine chemistry and marine biology of the Sea are extensively discussed. A special attention is paid to satellite monitoring of the state and different natural parameters of the Aral Sea and its surroundings. Further, the regional climate change is discussed and reasons for the progressing environmental crisis and present socio-economic problems in the region are also highlighted.

This book is addressed to the specialists working in various fields of physical oceanography, marine chemistry, biology, and environmental problems, who study the cascade of problems related to the Aral Sea: from regional climate change to distribution of benthic and pelagic organisms, and from remote sensing of the sea to archaeology of its coasts. It may also be useful to students and postgraduates specialising in the research of inland seas and lakes.

The editors and authors express the will that this monograph will help the readers complement the information on the nature of the changing Aral Sea, especially in relation to the present-day conditions of this extremely interesting and unique water body with a tragic history, to assess the alterations that have occurred over the last 50 years, and to establish new strategies for its conservation and recovery.

Alpine Waters, edited by Ulrich Bundi, The Handbook of Environmental Chemistry, Volume 6, 278 pp., Heidelberg, Germany, Springer-Verlag GmbH, 2010, EUR 229, ISBN 978-3-540-88274-9

Most of the world's mountains are rich in water and, as such, play a pivotal role in the global as well as in numerous regional water cycles. This book extensively portrays the highly diverse attributes of mountain waters and demonstrates their paramount importance for ecological and societal development.

The book starts with a synthesis on mountain water features and management concerns. This chapter summarises and complements the contents in the following chapters, and hence aims at transmitting a comprehensive view on the diverse mountain water issues, in general. The book is then divided into four parts comprising 13 chapters.

Part 1, *Alpine Water Resources*, examines the hydrological basics, the impacts of climate change in the Swiss Alps, and human interventions in mountain waters. Part II, *Biogeochemistry and Pollution of Alpine Waters*, deals with the chemistry of mountain rivers, the effects of acid deposition on high elevation lakes, the glaciers as archives of atmospheric deposition, and the occurrence of persistent organic contaminants. Part III, *Ecology of Alpine Waters*, discusses the ecological relationship between different water sources and associated habitats, important abiotic factors, and the biology of alpine streams. Part IV, *Case Studies*, presents four studies on integrated water assessment and management: Integrated Environmental Management of Hydropower Operation Under Conditions of Market Liberalization; Downstream Relevance of Reservoir Management; A Plea for the Restoration of Alpine Rivers: Basic Principles Derived from the 'Rhone-Thur' Case Study; and Water Management Challenges in Himalayan Watersheds.

The extensive summaries on the scientific basics of mountain waters are supplemented with considerations on the diverse water uses, need for management actions, and challenges regarding sustainable water management. This overview concerns not only the mountain areas themselves but also down river reaches and their surrounding lowlands, and, therefore, the relationship between mountain and lowland water issues.

Solvent Microextraction. Theory and Practice, by John M. Kokosa, Andrzej Przyjazny and Michael A. Jeannot, Hoboken, NJ, USA, John Wiley & Sons, Inc., 2009, 323 pp., EUR 92.40, ISBN 978-0-470-27859-8

From its inception as a curious and possibly useful academic research technique, solvent microextraction (SME) has, in the last dozen or so years, blossomed and matured into an important tool not only for research, but also for practising industrial, forensic, clinical and environmental analysts. SME has been used in the analysis of metabolic products in biological fluids, in contaminants in drinking and wastewater, in soils, in foods, in plastics, and in pharmaceuticals. The number of applications in these fields has been growing tremendously, and this book offers both a practical as well a theoretical approach to the

technique that should help analytical chemists to evaluate SME for a given sample preparation.

The first chapter overviews a comparison of SME with other sample preparation methods, like liquid-liquid, liquid-solid, headspace, solid-phase and solvent microextraction. A summary of the basic modes of operation and a detailed theoretical treatment of SME follows. The book then describes the practical aspects of the technique, including the selection of the appropriate mode of operation and the optimisation of the extraction conditions, with detailed chapters devoted to the preparation and analysis of atmospheric, solid and liquid environmental, clinical and industrial samples. The text concludes with the presentation of 11 practical experiments likely to be attempted by a new user of this technique.

The book also includes a CD-ROM containing summaries of 600 publications using SME, updated as of June 2009. Details of procedures for each major mode of solvent microextraction: direct immersion, headspace, DLLME, continuous flow SME, hollow fibre two-phase and three-phase SME, are provided in separate files. Less common modes of solvent microextraction, such as membrane-assisted solvent extraction, solvent bar microextraction, liquid-liquid-liquid microextraction, drop-to-drop and directly suspended droplet microextraction, cloud point extraction, homogeneous liquid-liquid extraction, and ultrasound-assisted emulsification-microextraction are included within the major modes.

The present book constitutes a unique source for the analyst that may find a useful compilation of reference material, a guide to proper experimental procedures, and a better understanding of how and why the technique works.

Nanochromatography and Nanocapillary Electrophoresis. Pharmaceutical and Environmental Analyses, by Imran Ali, Hassan Y. Aboul-Enein and Vinod K. Gupta, Hoboken, NJ, USA, John Wiley & Sons, Inc., 2009, 270 pp., EUR 72.60, ISBN 978-0-470-17851-5

Detection of drugs and xenobiotics at low concentration is required in a variety of medical and environmental situations, in order to avoid harmful side effects posed by chemical residues. Filling an important gap in the literature, the book details the instrumentation, detection, and application of nanoliquidchromatography (NLC) and nanocapillary electrophoresis (NCE) - that is, any liquid chromatographic and capillary electrophoretic method dealing with the detection of a sample at ng/L or lower – in the analyses of drugs, pharmaceuticals and xenobiotics in biological and environmental samples. However, nanoanalytical methods also refer to microchip-based techniques. The chip-based microfluidic devices are well recognised and used in many areas of biological sciences. Therefore, special emphasis is given to the instrumentation and analyses on chip-based NCE and NLC.

The book begins with an introductory chapter that defines and sets forth a protocol for nanoanalyses. The chapters that follow guide through such important topics as: Fabrication of glass, quartz, silica, plastic and polymer microchips, including surface modification; Instrumentation, detection, and sample preparation in NLC and NCE; Nano high-performance liquid chromatography; Nanocapillary electrochromatography and nanomicellar electrokinetic chromatography; and Chiral separations by nanoliquid chromatography and nanocapillary electrophoresis. Special reference is given to biological

and environmental samples. The book ends with a chapter on perspectives and challenges on Nanoanalyses.

The authors combine theory and practice, with examples of applications in materials science, nutrition, agriculture, chemistry biology and environmental science. Each chapter ends with a set of conclusions highlighting the most salient points as well as references to guide readers to the primary literature for further research.

This book will be useful for researchers, academicians and students in analytical chemistry, environmental monitoring and drugs analyses, and professionals of pharmaceutical, agrochemical and other chemical industries.

Basic Gas Chromatography, 2nd ed., by Harold M. McNair and James M. Miller, Hoboken, NJ, USA, John Wiley & Sons, Inc., 2009, 239 pp., EUR 52.20, ISBN 978-0-470-43954-8

Since the publication of the highly successful first edition of *Basic Gas Chromatography*, in 1998, the practice of chromatography has undergone notable developments. This second edition covers the latest in the field, giving readers the most up-to-date guide available, while maintaining the first edition's brief, practical, applied approach to the subject and its accessibility to a wide range of readers.

The text provides comprehensive coverage of basic topics in the field, such as stationary phases, packed columns and inlets, capillary columns and inlets, detectors, and qualitative and quantitative analysis. At the same time, the coverage of several topics has been expanded, including: Gas chromatography-mass spectrometry (GC-MS) and Sampling methods. In addition, a new chapter on Multidimensional GC has been incorporated. Also, two new topics have been added to the Special Topics chapter, namely, Fast GC and the GC Analysis of Nonvolatile Compounds, which also discusses the Chiral analysis by GC. The latter includes the original section on Derivatisation, supplemented with Inverse GC and Pyrolysis GC. Along with these new and updated topics, the references and resources have been revised to reflect the state of the field.

Special chapters are devoted to the different types of GC columns. Chapter 2 introduces the basic instrumentation and Chapter 7 elaborates on detectors. Other chapters cover stationary phases (Chapter 4). Qualitative and quantitative analysis (Chapter 8), programmed temperature (Chapter 9), and troubleshooting (Chapter 11). Chapter 10 briefly covers the important special topics of GC–MS, derivatisation, chiral analysis, headspace sampling, and solid-phase micro-extraction (SPME) for GC analysis.

A number of appendices at the end of the book provide guidelines for selecting capillary columns, how to avoid problems, operating conditions for capillary columns, liquid phases and some internet websites for GC.

The book should appeal to readers with varying levels of education and emphasises a practical, applied approach to the subject. *Basic Gas Chromatography, 2nd Edition* remains the standard handbook for everyone from undergraduates studying analytical chemistry to working industrial chemists. It is particularly suited for intensive short courses.

Mass Spectrometry. Instrumentation, Interpretation, and Applications, edited by Rolf Ekman, Jerzy Silberring, Ann M. Westman-Brinkmalm and Agneszka Kraj, Hoboken, NJ, USA, John Wiley & Sons, Inc., 2009, 371 pp., EUR 88.20, ISBN 978-0-471-71395-1

Featuring contributions from international experts, the text introduces the many perspectives and approaches that different scientific fields bring to mass spectrometry,

including applications in many fields. The text is divided into four parts that guide the reader from basic principles to applications.

Part I is devoted to mass spectrometry (MS) instrumentation. It begins with basic definitions and explanations (Chapter 1) followed by a discussion of the mass spectrometer and its building blocks, namely ion sources, mass analysers and detectors (Chapter 2). Next (Chapter 3), the text describes fragmentation methods and tandem MS analyser configurations, ending with a short summary of separation methods used in conjunction with mass spectrometry, e.g. CC-MS and LC-MS (Chapter 4). Part II provides the necessary knowledge for MS data interpretation in two important fields of application. Chapter 5 begins by explaining some basic concepts in mass spectra interpretation and then continues with describing in detail how to interpret mass spectra in organic chemistry. The subject of Chapter 6 is how to use mass spectrometry as a tool for peptide sequencing. In Chapter 7 the authors discuss how to optimise sensitivity and specificity in mass spectrometric proteome analysis. Part III features ten different fields where mass spectrometry is currently used. These include doping control, oceanography, proteomics and metabolomics, space sciences, bioterrorism, imaging of small molecules, clinical chemistry, polymers, forensic sciences and neurochemistry. Finally, an Appendix contains a list of tutorials, software, databases, journals and societies specialised in MS.

The book is particularly designed for graduate students, with the assumption being made that most of them will not become mass spectrometry specialists. Instead, it focuses on how they can use the technique to support and advance research across a broad range of disciplines.

Líquid Chromatography Time-of-Flight Mass Spectrometry. Principles, Tools, and Applications for Accurate Mass Analysis, edited by Imma Ferrer and E. Michael Thurman, Hoboken, NJ, USA, John Wiley & Sons, Inc., 2009, 261 pp., EUR 80.40, ISBN 978-0-470-13797-0

Leading experts offer in this book the latest developments of time-of-flight techniques for the identification of organic molecules using accurate mass determinations, as well as to address analytical problems in different fields. The book is divided into three parts:

- Part One: Principles and Theoretical Aspects of Accurate Mass, sets forth the fundamentals of accurate mass measurements with orthogonal axis time-of-flight mass spectrometry, and the mass defect, isotope clusters, and accurate mass for elemental determination.
- Part Two: Tools for Unknown Identification Using Accurate Mass, explores the range of TOF tools, including exact-mass databases, isotopic mass defects, and isotopic ratios and neutral losses for the identification of target and non-target analyses.
- Part Three: Applications of LC/TOF-MS for the Identification of Small Molecules, examines applications across a broad range of disciplines, including pharmaceuticals, pesticides, veterinary medicine, toxicology, forensics, environmental science, and food analysis.

Throughout the book, theoretical discussions are illustrated with concrete examples that show readers how to perform their own accurate analyses. By arming chemists with the principles, tools, and applications of LC/TOF mass spectrometry, this book enables

them to apply the most advanced techniques to analyse unknown and emerging contaminants with the greatest level of accuracy possible.

Modern Size-Exclusion Liquid Chromatography: Practice of Gel Permeation and Gel Filtration Chromatography, 2nd ed., by Andre Striegel, Wallace W. Yau, Joseph J. Kirkland and Donald D. Bly, Hoboken, NJ, USA, John Wiley & Sons, Inc., 2009, 494 pp., EUR 102.00, ISBN 978-0-471-20172-4

Much has changed in size-exclusion chromatography (SEC) since the publication of the first edition of this book in 1979. As a result, this second edition is an almost complete rewrite of the first, to take into account the many changes that have occurred in SEC since then.

The first chapters (Chapters 1 to 4) serve to introduce the reader to the fundamental chromatographic aspects of SEC: retention, band broadening and resolution. The treatment of these topics is rather detailed in the hopes of establishing a strong foundation on which to design and optimise separations. In Chapter 5 the various components of an analytical SEC system are described, concentrating on the hardware that precedes the column. The column is the focus of Chapter 6, where the types of columns and column packing materials available and how packing materials are synthesised and columns packed are reviewed. Chapter 7 provides a lengthy discussion of experimental variables, an extremely practical discussion about most of the considerations that an actual SEC practitioner must take into account to obtain reliable, reproducible data in a safe manner. The chapter on calibration techniques, Chapter 8, differentiates between the various types of calibration effected using narrow polydispersity standards, giving the relative advantages and disadvantages of each. The calibration methods based on broad molar mass distribution (MMD) standards, the accuracy and linear ranges of the various calibrations, and recent developments regarding band-broadening corrections for certain types of calibration methods are also discussed. Chapters 9 and 10 deal with physical and chemical detection methods, respectively. Chapter 11 is devoted to the architectural and thermodynamic information obtainable when a multiplicity of physical detection methods is used. Chapter 12 is dedicated to aqueous SEC as many types of analytes are water-soluble (e.g. proteins and peptides). Like the use of multiple detection methods, another area where SEC has experienced tremendous growth in the last decade is in the analysis of oligomers. This is due to the great advances in column technology for oligomeric analysis, driven in many ways by regulatory requirements. Oligomeric SEC is the subject of Chapter 13. Two current areas of growth for SEC are two-dimensional (2D) chromatography and high-speed analysis. These are the subject of Chapters 14 and 15. A number of other 'special techniques', such as recycle, inverse, vacancy, and differential SEC, as well as more widespread applications such as preparative SBC and size-exclusion electrochromatography are also discussed. High-temperature SEC and connections between SEC and rheology are explored in the final chapter (Chapter 16).

Throughout the text, detailed examples guide you step by step through the latest techniques and applications. With its extensive revisions and updates written by leading experts and pioneers in the field, *Modern Size-Exclusion Liquid Chromatography* offers readers everything they need to take full advantage of this popular macromolecular characterisation technique.

Environmental and Human Health Impacts of Nanotechnology, edited by Jamie R. Lead and Emma Smith, Chichester, UK, John Wiley & Sons, Ltd, 2009, 435 pp., EUR 120.00, ISBN 978-1-405-17634-7

Nanotechnology is a rapidly expanding field receiving extensive funding and development worldwide. A large number of novel processes occur on the nanoscale, and the unique properties of nanoparticles offer potential benefits in a range of applications, from consumer products to medicine and environmental protection. However, there remains considerable uncertainty with regard to the hazards and risks associated with nanoscience. An increased understanding of the environmental and human health impacts of engineered nanoparticles is essential for the responsible development of nanotechnology and appropriate evidence-based policy and guidelines for risk assessment.

Presenting the latest advances from a variety of scientific subjects, this book offers a comprehensive overview of this challenging, interdisciplinary research area, following the scope of a similar John Wiley's title – *Nanoscience and Nanotechnology. Environmental and Health Impacts* – edited by V.H. Grassian in 2008 (see IJEAC, **90**, 661, 2010).

After an introductory overview on the current knowledge of nanoscience in the environment, the subsequent chapters offer a detailed analysis of the properties, preparation methods and applications of nanomaterials (Chapter 2) and the chemical behaviour of nanomaterials that is likely to determine their environmental fate and toxicity, including size/shape, redox chemistry, sorption processes, cation diffusion kinetics and dissolution (Chapter 3). In Chapter 4 the available knowledge of natural aquatic and terrestrial colloids (including nanoparticles) is reviewed, including the major types of natural colloidal particles and their properties which are related to environmental processes. Chapter 5 reviews the available knowledge about natural and adventitious nanoparticles in the atmosphere with a focus on their sources, transformations and concentrations. The analysis and characterisation of manufactured nanoparticles in the environment are discussed in Chapter 6. This is followed by an extensive discussion of analytical tools for the characterisation of nanoparticles, such as fractionation, filtration, microscopy and spectroscopic methods. Chapters 7 and 8 discuss the ecotoxicology and toxicology of manufactured nanoparticles, while Chapter 9 reviews the occupational health and exposure of nanoparticles. In Chapter 10 regulation, policy and risk management are discussed. This chapter starts by presenting the risk assessment framework for chemicals and then discusses the risk assessment of nanoparticles. It also discusses the critical issues for risk assessment of nanomaterials and the approach that should be adopted for this purpose.

Environmental and Human Health Impacts of Nanotechnology will serve as a valuable resource for academic researchers in nanoscience and nanotechnology, environmental science, materials science and biology, as well as for scientists in industry, regulators and policy developers.

Introduction to Modern Liquid Chromatography, 3rd ed., by Lloyd R. Snyder, Joseph J. Kirkland and John W. Dolan, Hoboken, NJ, USA, John Wiley & Sons, Inc., 2010, 912 pp., EUR 100.20, ISBN 978-0-470-16754-0

Since the preparation of the second edition in 1979, there have been major improvements in HPLC columns and equipment, as well as numerous advances in our understanding

of HPLC separation, our ability to solve problems that were troublesome in the past, and the application of HPLC for new kinds of samples. Since then, it has become possible to greatly accelerate method development, especially with the help of appropriate software. At the same time HPLC practice is increasingly carried out in a regulatory environment that can slow the release of a final method. These various advances and changes in the way HPLC is carried out have mandated major changes in the present edition. However, the organisation is similar to that of the second edition, combining both theory and practice so that the reader can better understand and evaluate the various recommendations presented.

Chapter 1 provides a general background for HPLC, with a summary of how its use compares with other modern separation techniques. Chapter 2 develops the basis of HPLC separation and the general effects of different experimental conditions. Chapters 3 and 4 deal with equipment and detection, respectively. Chapter 5 deals with the column: the 'heart' of the HPLC system. A complete overview of column supports and stationary phases as well as the problems associated with the column selectivity and column handling is presented. Chapter 6, which deals with the reversed-phase separation of non-ionic samples, extends the discussion of Chapter 2 for these important HPLC applications. A similar treatment for normal-phase chromatography (NPC) is given to Chapter 8, including special attention to hydrophilic interaction liquid chromatography (HILIC). In Chapter 7 the separation of ionised or ionisable samples is treated, whether by RPC, ion-pair chromatography, or ion-exchange chromatography. Gradient elution is introduced in Chapter 9 for small-molecule samples, and as an essential prerequisite for the separation of large biomolecules in Chapter 13; two-dimensional separation – another technique of growing importance – is also discussed. Chapter 10 covers the use of computer-facilitated method development (computer simulation). Other important, general topics are covered in Chapters 11 (Qualitative and Quantitative Analysis) and 12 (Method Validation). Chapter 13 introduces the separation of large molecules, including both biological and synthetic polymers. HPLC procedures that are uniquely useful for these separations are emphasised: reversed-phase, ion-exchange, and size-exclusion, as well as related two-dimensional separations. Chapter 14 (Enantiomer Separations) marks a decisive shift in approach, as the resolution of enantiomers requires columns and conditions that are sample-specific, unlike most of the HPLC applications described in earlier chapters. Chapter 15 deals with preparative separations ('prep-LC'), where much larger sample weights are introduced to the column. Chapter 16 (Sample Preparation) provides a comprehensive coverage of this important supplement to HPLC separation. Finally, Chapter 17 deals with HPLC troubleshooting. An extensive and very useful description of the many problems that may occur with the equipment, columns, materials, and the technique itself, with various recommendations for both method development and routine use, is provided.

This third edition is highly cross-referenced, so as to allow the reader to follow up on topics of special interest, or to clarify questions that may arise during reading. The third edition of *Introduction to Modern Liquid Chromatography* will continue to be the HPLC reference book for thousands of readers, either experienced workers who may wish to explore topics of his/her choice, or find an answer to specific problems, or beginners who would like to understand and know the possibilities offered by the technique.

Practical Aspects of Trapped Ion Mass Spectrometry, Theory and Instrumentation, edited by Raymond E. March and John F. J. Todd, Boca Raton, FL, USA, CRC Press, 2010, 922 pp., ISBN 978-1-42000-8371-2

This monograph is Volume IV of a mini-series devoted to practical aspects of applications of mass spectrometry for the study of gaseous ions confined in ion traps. It is composed of six parts: Fundamentals; New Ion Trapping Techniques; Fourier Transform Mass Spectrometry; Quadrupole Rod Sets; 3D-Quadrupole Ion Trap Mass Spectrometry; and Photochemistry of Trapped Ions.

Within the first Part, Chapter 1 presents a brief history of our understanding of atoms and charged particles, together with an account of experiments with particle beams. In Chapter 2, the miniaturisation of ion traps as well as multiplexed and soft-landing technologies are presented. New experiments of sets of traps assembled in various geometrical arrangements are described. Part II, *New Ion Trapping Techniques*, presents discussions of theory and practice of new methods for trapping ions, such as the Orbitrap^{TM}, the digital ion trap (DIT), the rectilinear ion trap (RIT), and the toroidal ion trap; the development and application of the quadrupole ion trap (QIT) and the quadrupole linear ion trap (LIT); and the introduction of high-field asymmetric waveform ion mobility spectrometry (FAIMS). The Orbitrap mass analyser represents only the first commercial implementation of a highly promising class of devices where ions are separated on the basis of their m/z-values over the course of multiple reflections or deflections in an electrostatic field. The reader is introduced to the basic concepts and advantages of the novel ion trap geometries. The three chapters of Part III, *Fourier Transform Mass Spectrometry* (FTMS), are devoted to discussions of ion accumulation for increasing sensitivity in FT-ICR spectrometry, the radio frequency-only-mode event for Penning Traps in FTMS, and a Fourier transform operating mode applied to a three-dimensional quadrupole ion trap. Part IV, *Quadrupole Red Sets*, presents three aspects of the behaviour of quadrupole rod sets, which are now ubiquitous in mass spectrometry laboratories. The trapping and processing of ions in RF ion guides of a tandem mass spectrometer is followed by two discussions of the linear ion trap (LIT): first, mass-selective axial ion ejection in the LIT and, second, axially resonant excitation in the linear ion trap (AREX LIT). Part V, *3D-Quadrupole Ion Trap Mass Spectrometry*, is composed of seven chapters that illustrate and exemplify the extent of development of the 3D-QIT in recent years. Finally, Part VI, *Photochemistry of Trapped Ions*, introduces the general topic of photodissociation in ion traps, which is followed by a discussion of chemical and photochemical studies of metal dication complexes in a 3D-QIT.

This volume, written by leading experts and up-and-coming researchers, presents a cohesive, global and up-to-date view of the practical aspects of using trapped ion devices that will be of reference for academic and industrial practitioners.

Environmental Microbiology, 2nd ed., edited by Rama M. Maier, Ian L. Pepper and Charles P. Gerba, Amsterdam, The Netherlands, Academic Press, 2009, 624 pp., EUR 73.46, ISBN 978-0-12-370519-8

This leading textbook builds on the academic success of the previous edition by including an up-to-date discussion of environmental microbiology as a discipline that has grown in scope and interest in recent years. In the intervening years since, there has been a virtual

explosion of knowledge on microbial diversity and communities in various environments. As a result, in the second edition, new chapters have been added, on extreme environments, microbial communities and communication among microorganisms, domestic microbiology, bioterrorism, and the impact of global change on microbial infectious disease.

The overall objectives of the text are to define the important microbes involved in environmental microbiology, the nature of the different environments in which the microbes are situated, and the methodologies used to monitor the microbes and their activities and, finally, to evaluate the effects of these microbes on human activities. To this end, the book is organised in eight subject areas presented in a logical progression: (1) foundation chapters to provide an adequate background for the advanced material presented in subsequent chapters; (2) chapters on microbial environments, including earth, aquatic, and atmospheric; (3) chapters on detection and quantitation of microbial activity, including cultural, microscopic, physiological, molecular, and immunological approaches; (4) chapters on microbial interactions with their environment from element cycling to microbial communication to development and movement of bacterial communities; (5) chapters on microbial remediation of organic and metal pollutants; (6) chapters on water and food-borne pathogens; (7) chapters on waste treatment and drinking water; and, finally, (8) chapters on urban issues including domestic and indoor microbiology, bioterrorism, and risk assessment.

This second edition provides practical applications of core lab methods and a solid focus on microbes as elements in waste, pollution, pathology and environmental management. At the end of each chapter, the information is complemented with case studies, which are effectively used to highlight particular issues, and with questions and problems as well as recommended readings.

This excellent textbook, not only with respect to its contents but to the formal presentation (extensively and pretty illustrated and referenced), is designed for a senior-level undergraduate class or a graduate-level class in environmental microbiology and to serve as a reference for scientists and engineers interested in this field.

Rapid Chemical and Biological Techniques for Water Monitoring, edited by Catherine Gonzalez, Richard Greenwood and Philippe Quevauviller**,** Chichester, UK, John Wiley & Sons, 2009, 440 pp., EUR 144.00, ISBN 978-0-470-05811-4

The book is the eighth in the series *Water Quality Measurements*, aiming at providing comprehensive coverage of the analytical techniques used for the measurement of substances in water, from sampling to laboratory analysis. The scope of the series encompasses topic issues including quality assurance, standard procedures, and the best practices in measuring water quality, from surface and drinking water to marine and wastewater. Effective monitoring of water quality is essential to underpin the legislative frameworks. Therefore, the techniques are discussed in relation to current legislation and guidelines (see IJEAC, **89**, 478, 2009).

Rapid Chemical and Biological Techniques for Water Monitoring has been written by experts in water analyses, including classical and emerging techniques, and offers the reader an overview of existing knowledge and trends in monitoring based on rapid biological and chemical techniques. The contributions are organised in six sections, encompassing: Screening Methods in the Context of Water Policies; Chemical Methods; Biological Methods; Potential Use of Screening Methods and Performance Evaluation for

monitoring trace metals and organic pollutants; Quality Assurance and Validation Methods; and Integration of Screening Methods in Water Monitoring Strategies. Thus, the volume examines the range of technologies and methodologies, their properties and their applicability and potential contribution in monitoring programmes. The book illustrates, for example, the utility of the monitoring tools for laboratory and field applications; brings together a wide range of monitoring tools – both those available and some under development; and provides an assessment of the potential for underpinning environmental management and legislation.

The range of promising tools for inclusion in the toolboxes of those charged with managing water quality is expanding. Many of the presented methods have the potential to be included in the set of useful tools in the toolbox available to those responsible for monitoring and improving water quality under the various legislative frameworks. Scientists, analysts and policy developers will find the book attractive for their specific needs.

Geochemistry of European Bottled Water, edited by Clemens Reimann and Manfred Birke, 268 pp., Stuttgart, Germany, Borntraeger Science Publishers, 2010, EUR 78, ISBN 978-3-443-01067-6

High quality geochemical databases are an essential component of environmental knowledge and sustainable management; they provide pertinent information for administrative and legal issues. This volume presents the chemical composition of 1785 bottled water samples from 38 European countries (1247 different sources at 884 locations) purchased by a network of geochemists in supermarkets during 2008. Subsequent analysis in a single laboratory (c. 70 elements by ICP-MS, ICP-OES, IC and pH, alkalinity, etc.), has produced a harmonised data set previously unavailable at this level of completeness, quality and spatial coverage.

Bottled water can be considered as a proxy for groundwater composition. This impressive bottled water data set is thus used to provide a first impression of variability and the regional distribution of groundwater chemistry at a continental scale. After a presentation of the concept of the 'Geochemistry of European Bottled Water' Project, the book introduces the hydrochemistry of groundwater and the factors that influence its composition, namely topography, geology, soil, climate, vegetation and land use.

Then, the analytical methods used, including sampling, quality control and data analysis and mapping are described. The maps and statistics for each element/parameter presented in the following chapters allow the reader to identify the influence of geology on water composition. Furthermore, the enormous natural variation in concentration (up to seven orders of magnitude) of many of the analysed elements in groundwater is documented. The bottled water data are plotted against European surface water, tap water and Norwegian bedrock groundwater in cumulative probability diagrams that highlight the similarities and differences between these different water types.

The book also presents a review of the legal framework for bottled water sold in the European Union. It provides a comprehensive compilation of current drinking water action levels in Europe, particularly those of the European Drinking/Mineral Natural Water directives, as well as the limiting concentrations from 26 European countries and the values recommended by the WHO, FAO and the US EPA.

The accompanying CD-ROM provides all the raw data sets used for writing the book (bottled water, European surface and tap water, Norwegian hard rock groundwater).

A pan-European harmonised dataset of natural groundwater quality would contribute significantly to an understanding of groundwater quality across Europe and may support implementation of the EU Water Framework Directive. The statistics and maps provided in this book are stimulating and could be used for teaching purposes at universities. They will also offer new ideas for further research.

New Techniques for the Detection of Nuclear and Radioactive Agents, edited by Gui Asiye Aycik, 347 pp., Dordrecht, The Netherlands, Springer, 2009, EUR 139.95, ISBN 978-1-4020-9598-6

This book is part of the NATO Science for Peace and Security Series devoted to assess emerging risks to the environment and society that could cause economic, cultural and political instability (see IJEAC, **89**, 1003, 2009). The book is a direct outcome of the Advanced Training Course held in Mugla (Turkey) on May 2008. The Course was convened to review the global experience in monitoring and detecting (identification and characterisation) of confiscated radioactive materials and agents.

The book brings together 28 contributions from well known researchers in their fields as specialists, and contributions from fundamental principles to materials, systems and applications in their countries by participants. A central theme of the book is focused on the new techniques based on radiation monitoring, measuring and analysing radioactive-nuclear materials, agents and devices useful for environmental protection as quantitatively and qualitatively.

The smuggling of fissile materials for proliferation purposes or for terrorism is a matter of increasing concern. The ongoing progress in related area including gamma spectroscopy, detection systems of alpha, beta, gamma and neutron sources as well as auxiliary methods and application areas in different countries are also presented in the book.

Environmental problems caused by past or present military activities are also of great interest. Thus, the book presents environmental data from many locations of different countries and also contains the contributions in the detection/monitoring programmes of some authors from the former Soviet republics.

The many recent examples contributed by authors will be useful in monitoring/measurement studies of radioactive/nuclear agents in the present environment, and can help, not only in carrying out outdoor and laboratory experiments, but also in the protection of possible sources of radionuclides and nuclear agents.

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