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BOOK REVIEWS

ACCELERATION AND AUTOMATION OF SOLID SAMPLE TREATMENT, by M.D. Luque de Castro and J.L. Luque García, 574 pages. Elsevier, Amsterdam (2002). ISBN 0-444507-16-7. EUR 250.00.

Although sample preparation is the most time-consuming step and considered the bottleneck of the whole analytical process, its application is crucial and specific to each matrix and cannot be avoided even in case of the application of sophisticated analytical techniques. Efforts in sample pretreatment and automation have been developed in the last decade. At present, a large number of publications have appeared on this topic, but its systematic treatment is only partially covered in specific subjects such as reviews and a few books.

This book fills the existing gap for solid samples pretreatment and its automation. It is designed to provide the analytical chemist with the background required to understand the concepts inherent to solid sample pretreatment, methodologies, instrumentation and relevant applications. The book is divided into nine chapters providing a logical, systematic introduction to all aspects involved in the different methods of sample preparation and automation.

Topics such as freeze-drying, ultrasounds, microwave treatment, high-pressure high-temperature extraction, supercritical fluid extraction, laser ablation, the use of electrothermal devices and glow-discharge processes are dealt with systematically in all their relevant aspects. One chapter is devoted to specific sample pretreatment methods involving the removal of volatile species and provides a comprehensive discussion of hydride generation, headspace sampling, pervaporation and solid-phase microextraction. Automated and computer-controlled methods are given proper emphasis throughout, and the role of workstations and robots in the analytical process is discussed in a separate chapter. Every chapter contains a large number of updated references up to 2001, many of them from the University of Cordoba, which underlines the expertise of book authors in the topics covered.

Therefore, the book will be very useful to analytical chemists working in many application fields interested in updating their knowledge of sample preparation and automation and to post-graduate education in analytical chemistry. Accordingly, the book can be considered a reference in modern extraction techniques for solid samples.

ORGANOFLUORINES. The handbook of environmental chemistry 3N, edited by A.H. Neilson, 352 pages. Springer, Berlin (2002). ISBN 3-540-42064-9. EUR 149.00.

This volume brings together expertise in a wide range of disciplines related to organofluorines, including their environmental impact and effects in mammals. Chapter 1 is

devoted to the application of ^{19}F NMR spectroscopy to the structure elucidation organofluorine compounds and to drug and microbial metabolism. Chapter 2 is focused on the fate of organofluorine compounds and their distribution in relevant environmental compartments emphasizing the different behaviour in comparison with structurally related organochlorine compounds. The atmospheric chemistry and the environmental impact of hydrofluorocarbons and hydrofluoroethers are discussed in Chapter 3, which also addresses the issue of the unknown trifluoroacetic acid source. The origin and distribution of trifluoroacetate, perfluoroalkane sulfonates and perfluoroalkane carboxylates are discussed in detail in Chapter 4, and the photolability of aromatic trifluoromethyl compounds is also discussed.

It is important to note that organofluorine compounds are not only of synthetic origin, since some of them occur in nature. The unexpected occurrence of biosynthetic organic fluorine compounds is then presented in Chapter 5. Their metabolism is discussed in Chapter 6, covering both biotic and abiotic degradation. The wide range of consequences of the peroxisome proliferation in rodent is illustrated in Chapter 7. Some analytical aspects that demonstrate the similarities of fluorinated aromatic compounds and their unsubstituted analogues are discussed in Chapter 8. The application of fluorinated aromatic compounds to discover the mechanism of action of cytochrome P450 in mammals and its role in the induction of cancer are presented in Chapter 9. The phosphorofluoridates that are extremely toxic towards the central nervous system achieved notoriety as chemical warfare agents in the 1930s. The biochemical mechanism of their activity and the increasing importance in destroying the now redundant arsenals of these compounds are presented in Chapter 10.

The broad scope of this volume and the multidisciplinary point of view of organofluorine compounds will certainly be of interest to a wide audience interested in environmental, analytical, metabolism and toxicological aspects of organofluorine compounds. Accordingly, these compounds are under scrutiny in most developed countries due to their extremely high chemical stability.

SAMPLING AND SAMPLE PREPARATION FOR FIELD AND LABORATORY, edited by J. Pawliszyn, 1131 pages. Elsevier, Amsterdam (2002). ISBN 0-444-50511-3. EUR 380.00.

The purpose of this multi-author book is to address the needs and challenges of modern sampling and sample preparation for trace organic analysis. To facilitate recognition of sample preparation as a separate science with its unique challenges and research opportunities, the primary focus of the book is on fundamental aspects of extraction technology. Leading scientists in this area have contributed to 33 chapters on modern aspects of headspace, liquid, solid-phase and membrane extractions with and without derivatization steps as well as the challenges associated with different types of matrices.

In the chapter on extraction technology fundamentals, a new concept called the 'Unified Theory of Extraction' is developed, outlining common features among extraction technologies. The application chapters are dedicated to different types of matrices (i.e. clinical and pharmaceutical, pheromone, water, food, soil, forensic, trace-element speciation), and focus on the impact of new technologies on the practice of sample preparation. There are some contributions that are concerned with the physicochemical properties of sample matrices and their effects on method development. Also, there are separate chapters focusing on sampling strategies and equipment, and many authors

discuss the topic with their own contributions, emphasizing the fact that extraction technologies should not be considered in isolation but should be well integrated with the sampling and introduction to analytical instrument steps. This is particularly important when implementing analytical technology directly on site. Finally, several chapters focus on new extraction materials (i.e. membranes, novel fibrous systems, new polymeric extraction materials, immunosorbents) which could facilitate further improvements in the sample-preparation technology.

Certainly, this book will help to establish sampling and sample handling as outstanding disciplines in analytical chemistry because it brings together fundamental and applications in the most important fields. Therefore, it will be useful to undergraduates, graduates, and practising analytical chemists in most application fields.

ENVIRONMENTAL ORGANIC CHEMISTRY (2nd edition), by R.P. Schwarzenbach, Ph.M. Gschwend and D.M. Imboden, 1313 pages. Wiley-Interscience, Hoboken, NJ, USA (2003). ISBN 0-471-35750-2. USD 125.00.

Starting with structure and few measured parameters, the first edition of this book developed quantitative tools for understanding the environmental fate of organic compounds in different environmental matrices. The second edition of this book follows the same approach but expands the coverage considerably with new material and with numerous 'illustrative examples'. With more than 1300 oversized pages, the book can be considered as the '*Bible of Organic Environmental Chemistry*'.

Unlike the first edition, the book is divided into five parts. The first is a general overview of the topic and an introduction to organic chemical classification and nomenclature. The second and longest part begins with an overview on the use of partition coefficients in organic environmental chemistry and discusses equilibrium partitioning between gaseous, liquid and solid phases. The remainder of this part covers intrinsic physical properties that control a compound's fate in the environment, such as vapour pressure, water solubility; air-organic, air-water, organic-water partitioning; and sorption, including bioaccumulation and 'baseline toxicity'. The authors cover hydrolysis, redox, photolysis, and biological transformation processes in this part. The fourth part presents some modelling tools including box models. The lessons learned from the first 1000 pages are applied to some case studies that include lakes, rivers, and groundwater in the last part. Extensive appendices (5) with useful chemical and mathematical facts and a 42-page updated literature complete the book.

This book is replete with numerous real-world examples, and these pedagogical aids are certainly welcome. Almost every chapter ends with several qualitative questions and quantitative problems. Unfortunately, no solution manuals or answers to selected problems are available as yet.

Obviously, the book is of interest to graduate and undergraduate students and teachers but, because of its length, cannot be used as a regular textbook. Civil and engineering professors and students will benefit from this book. Environmental policy and management professors and students should also benefit by identifying our capabilities and limitations in estimating chemical exposures. Finally, chemists and chemical engineers in industry should use the book's information to help make 'green chemistry' decisions, and governmental regulators and environmental consultants should be better able to analyse the problem sites. Despite its oversize, the

book will be a reference and certainly will help to establish the subject discipline in the near future.

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HANDBOOK OF ECOTOXICOLOGY (2nd edition), edited by D.J. Hoffman, B.A. Rattner, G.A. Burton, Jr and J. Cairns, Jr, 1290 pages. CRC Press, Boca Raton, FL (2003). ISBN 1-56670-546-0. USD 189.95.

Ecotoxicology is a rapidly growing field that focuses on the study of the effects of potentially toxic agents on natural ecosystems, including prediction of effects on non-target species. This second edition of *Handbook of Ecotoxicology*, divided into five sections and 45 chapters, includes contributions from over 75 international experts, and provides a wide and comprehensive coverage of the following general areas: (I) methods used to quantify ecotoxicological effects under controlled experimental conditions and under natural conditions; (II) major classes and effects of environmental contaminants and other anthropogenic processes that disrupt ecosystems; (III) real case histories involving contaminant disruption of natural ecosystems; (IV) techniques used for making estimates, predictions, and models for risk assessments of potential ecotoxicological effects; and (V) new and significant issues in ecotoxicology.

Section I gives an overview of current methodologies for testing in aquatic toxicology, the use of microcosms and mesocosms, soil ecotoxicology, sediment toxicity, algal and plant phytotoxicity, wildlife toxicology testing for multiple terrestrial species, and landscape ecotoxicology. The identification of monitoring programs and current use of biomarkers and bioindicators in aquatic and terrestrial biomonitoring are also important chapters in this section.

Section II describes the effects of environmental contaminants that have been identified as significant hazards in ecosystems, among them, persistent organochlorinated compounds, heavy metals, petroleum hydrocarbons and individual PAHs, organophosphorus/carbamate pesticides, and urban runoff. Nuclear and thermal stress, the effects of deforestation, pathogens and disease, and environmental factors affecting contaminant toxicity are also addressed.

Section III presents case studies and ecosystems surveys, including the Chernobyl accident, effects of PCBs on the Hudson River, or the effects of agricultural pesticides in migratory birds in Argentina. Altogether, those cases illustrate the impact of different environmental contaminants on diverse ecosystems.

Section IV describes methods and approaches used for estimating and predicting the outcome of potentially ecotoxic events for the purposes of risk assessment. These include global disposition of contaminants, bioaccumulation and bioconcentration, quantitative structure activity relationships (QSARs), and population modelling in contaminant studies. Current EPA guidelines and an exemplary chapter of ecological risk assessment are included in this section.

All this information is completed and updated in Section V, which identifies and describes a number of new and significant issues and approaches in ecotoxicology, most of which have come into focus recently (such as the endocrine-disrupting chemicals and endocrine active agents in the environment, the possible role of contaminants

in the worldwide decline of amphibian populations, and potential genetic effects of contaminants on animal populations). Other important topics include industrial ecology and natural capitalism, indirect effects of agricultural pesticides on wildlife, and the role of nutrition on contaminant toxicity.

In summary, this book is destined to be the reference on ecotoxicology, offers a valuable overview of the subject, and constitutes a valuable guide to students, researchers, consultants, and other professionals in environmental sciences, toxicology, chemistry, biology, and ecology.

ENDOCRINE DISRUPTERS IN WASTEWATER AND SLUDGE TREATMENT PROCESSES, edited by J.W. Birkett and J.N. Lester, 312 pages. Lewis, CRC Press, Boca Raton, FL (2003). ISBN 1-56670-601-7. USD 99.95.

Endocrine-disrupting chemicals (EDCs) have been shown to produce changes in the endocrine system of organisms that lead to increases in cancers and abnormalities in reproductive structure and function. Recent research has highlighted the existence of hormonally active compounds in sewage and industrial effluents and their potential for recycling back into the environment, including drinking-water supplies.

This book, divided into eight chapters, presents the latest research on EDCs. It gives a synthetic overview of the problem and describes different EDCs and their properties, their sources, fate, and transport, focusing on sewage and industrial effluents, sludge treatment, and disposal options. Finally, the presence of EDCs in the receiving aquatic environment (bioavailability, bioaccumulation and effects) and in drinking water (legislation and policies) is considered, together with management strategies and water-reuse aspects.

In summary, the book presents up-to-date information on EDCs in wastewater and sludge treatment processes. Sources, fate and effects are presented, together with a good compilation of the current legislation, future research needs, and future management strategies for endocrine disrupters. Overall, the information is clearly presented, includes many detailed and comprehensive tables that facilitate speedy access to precise data, and constitutes an excellent resource for research workers and professionals in the field of Environmental Toxicology.

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ENVIRONMENTAL CHEMISTRY, by J. Wright, 419 pages. Routledge (Taylor & Francis Group), London (2003). ISBN 0-415-22601-5. £ 20.99.

This book offers an introduction to basic chemical concepts and attempts to apply them to relevant environmental situations and issues. The first part, including from the structure of the atom to those of organic chemicals, and basic chemical concepts such as chemical reactivity and bonding, energy, and entropy, could probably be omitted because it is difficult in a reduced number of pages to introduce all the concepts that will be required to follow the second and more specific part. This part covers the air, soil, and water compartments from an innovative perspective, including many timely concepts, such as sustainability, precautionary principle, risk assessment, etc. The first chapters look at the planet Earth and the origin of our environment – the formation of

elements and the Earth's atmosphere, hydrosphere and lithosphere; the earth as a finite resource – renewable and non-renewable resources. Then, risk and hazards – risk assessment and management of hazard identification – are dealt with. An introduction to chemical reactions occurring in the environment, the lithosphere and its erosion and pollution, the chemistry and pollution of the atmosphere, the properties of natural waters and their pollution, organic chemicals, and their environmental effects are then covered. The book ends with a chapter on energy production and the environmental consequences.

Environmental Chemistry makes the subject accessible to those with little knowledge of chemistry. Together with global case studies, it contains end-of-chapter summaries, discussion points, and annotated guides for further reading. Therefore, the book should be useful to undergraduates who study environmental chemistry as part of a qualification in environmental or related studies.

METHODS FOR ENVIRONMENTAL TRACE ANALYSIS, by J.R. Dean, 259 pages. Wiley, Chichester, UK (2003). ISBN 0-470-84422-1. USD 50.00.

This book covers one of the most neglected areas in environmental trace analysis, namely that of sample preparation. The text discusses all of the necessary steps for analysing a sample for both trace metals and organics, from the initial sampling protocols to the range of possible sample preparation methods, and leading finally to the analysis and recording of data. The text is arranged into 12 chapters, covering the essentials of basic laboratory skills, investigative approaches for sample preparation, sampling, storage of samples, sample preparation for organic and inorganic analysis (solids and liquids), pre-concentration approaches, instrumental techniques for trace analysis, recording of information in the laboratory, and selected more specialized resources (books, journals, website addresses, etc.).

Information provided on the specific methods to follow for preparing a sample for metal and organic analyses from a series of matrices is very detailed, highly illustrated, and easy to read. Written in an open-learning/distance-learning style, it is ideal for use as a self-study guide or as the basis of a taught course. *Methods for Environmental Trace Analysis* will be invaluable to undergraduate students pursuing courses in analytical chemistry, as well as subsidiary courses in life, environmental, and food sciences.

SAMPLING FOR MEASUREMENT OF ODOURS, by P. Gostelow, P.J. Longhurst, S.A. Parsons and R.M. Stuetz, 80 pages. IWA, London (2003). ISBN 1-843390-33-7. £ 37.50 (IWA member), £ 50.00 (non-member).

Effective odour management requires measurement. However, this responds to a very subjective perception. Moreover, most odorous emissions consist of complex mixtures, difficult to identify. Despite its brevity, this Scientific and Technical Report of IWA (No. 17) is a very comprehensive and practical guide to the techniques currently available for odour source sampling, sample collection and preservation, and odour measurement. It has arisen from a need to consolidate earlier studies across various sectors, in particular the agricultural and wastewater treatment industries. Most of the references relate to these fields. There are, however, several examples of sampling of landfill gas emissions, which are directly relevant to odour sampling.

The report highlights the sources of variability in the different techniques, to make the practitioner aware of their implications and indicate best practice where it exists as well as research areas where knowledge is lacking. To this end, the different techniques are discussed in detail, and summary tables are provided which underline the advantages, disadvantages and potential applications of each technique. The booklet concludes with an appendix including a list of odorants associated with waste treatment, with the malodorous threshold levels, and terms and definitions used in this area.

AIR POLLUTION SCIENCE FOR THE 21ST CENTURY, edited by J. Austin, P. Brimblecombe and W. Sturges, 676 pages. Elsevier, Amsterdam (2002). ISBN 0-08-044119-X. USD 140.00.

This book is the first in the Developments in Environmental Science series, intended for the publication of environmental issues from the perspective at the end of the last century and looking into the present one. The book is a compilation of 23 extensive reviews and feature articles published during 1999–2001 in *Atmospheric Environment* on the science and application of air-pollution research at the start of this new century. Short appendices to the main articles have also been included to update the information.

The main issues that have dominated tropospheric air pollution for the last 30 years have been acid rain, photochemistry, long-range transport of pollutants, greenhouse gas emissions, and aerosols. At the start of the 21st century, acid rain is subject to planned improvements in Europe and North America but is still a growing problem in Asia. Tropospheric ozone is understood much better, but the problem is still with us, and desirable levels are difficult to achieve over continental Europe. The heterogeneous chemistry responsible for ozone depletion in the stratosphere is now reasonably clear, but there is ongoing interest in the sources and sinks of CFC (chlorofluorocarbon) replacements in the troposphere. There is also increasing interest in indoor air quality, and the origin and health implications of atmospheric particles. Perhaps most important on a global perspective, intensive research has not yet determined the relationship between greenhouse gases, aerosols, and surface temperature.

The book addresses all these topics, with particular reference to indoor/outdoor air quality and human exposure, the transport sector as a source of air pollution, the wide field of atmospheric chemistry, including the formation and measurement of aerosols, and the new directions in negotiating and building atmospheric regulations. Certainly, readers from both academia and administration will find stimulating ideas and areas in the book to direct scientific, technical and regulatory efforts.

NATURAL PRODUCTION OF ORGANOHALOGEN COMPOUNDS, edited by G.W. Gribble, 312 pages. Springer, Heidelberg, Germany (2003). ISBN 3-540-41842-3. EUR 149.95.

This is volume 3·P of the excellent collection *The Handbook of Environmental Chemistry*, edited by O. Hutzinger. The present book summarizes the state-of-the-art knowledge on naturally occurring organohalogenes, of which more than 3700 are documented.

The chapters cover all aspects of this field, including the structural diversity and sources of organohalogens, the mechanisms for their formation and biodegradation, and some therapeutic uses. Both biogenic and abiogenic sources and sinks of organohalogens are discussed, such as those of the ubiquitous monohalomethanes, and their atmospheric budgets, and those formed in soils and sediments during early diagenetic processes or in volcanic emissions. Marine sources and sinks of volatile organohalogens are also discussed, with an emphasis on methyl halides.

The enormous advances made in our understanding of the organohalogens biosynthesis, biotransformation, and physiological roles are extensively presented in separate chapters. These include fungal metabolites, the enzymology, molecular genetics, and biosynthetic pathways involved in biological halogenation and, particularly, halogenation in humans. The sources and biosynthesis of the relatively rare natural organofluorines, e.g. the highly toxic plant metabolite fluoroacetate, are also discussed. The biogeochemical cycle of these compounds is completed with a chapter dealing on environmental dehalogenation. Finally, the clinical use of dichloroacetate and the synthesis of the powerful anticancer chlorine-containing cryptophycin are presented.

Only with a better understanding of the role that nature plays in the area of organohalogens can we more intelligently regulate the production, use, and disposal of anthropogenic organohalogen compounds. Certainly, the volume contains all relevant information at this respect, following the accurate presentation and scientific rigor of previous volumes in the collection.

SAMPLING AND ANALYSIS OF ENVIRONMENTAL CHEMICAL POLLUTANTS. A COMPLETE GUIDE, by E.P. Popek, 356 pages. Academic Press, San Diego, CA (2003). ISBN 0-12-561540-X. £ 63.00.

This handbook offers a common-sense, practical approach to project planning, fieldwork, and data interpretation, and provides detailed procedures for sampling key environmental matrices. After a general introduction on the sample and error, the book describes the project planning from the standpoint of data-quality objectives (sampling strategies, selection of methods, cost estimates, planning documents, etc.). There then follows the practical approach to sampling, requirements for laboratory operation, and data-quality assessment. A large number of examples of forms and tracking logs to be used in sampling and analysis, as well as references in the field, are included at the end of the volume. It also contains many practical tips on planning, sampling interactions with the analytical laboratory, and data-quality evaluation.

In a clear and logical manner, this comprehensive guide presents everything an environmental professional needs to know to competently collect environmental chemical data. The guide centers on the basic underlying principles of environmental sampling and analytical chemistry, and summarizes the universally accepted industry practices and standards. Although all procedures have been adapted from the US EPA, DOD, and DOE protocols, they have been revised to reflect the practical field conditions elsewhere.

The topic is of importance to a wide range of environmental professionals from a variety of disciplines. This is a reference source for improving the understanding of the data-collection process and the resolution of the most common problems that environmental professionals face daily in their work.

GLOW DISCHARGE PLASMAS IN ANALYTICAL SPECTROSCOPY, edited by R.K. Marcus and J.A.C. Broekaert, 482 pages. Wiley, Chichester, UK (2003). ISBN 0-471-60699-5. USD 225.00.

Glow discharge devices are well known for their application in direct solids elemental analysis of metals and alloys by optical and mass spectrometries. These basic capabilities have been extended to the analysis of non-conducting materials such as glass and ceramics and the depth resolved of all kinds of technical materials.

Glow Discharge Plasmas in Analytical Spectroscopy is a multi-authored volume that hopes to capture the present state of the art in the use of these devices across a wide range of analytical applications, including materials science, environmental analysis, and bioanalytical chemistry.

The chapters in the volume deal with both basic and highly complex applications. They have been arranged first to present the basic technology and science underlying the most widely employed implementations of GD sources. Then, specific application areas of technological (and economic) significance, such as in the steel and nuclear industries, in the analysis of surfaces and coatings, non-conducting materials, and liquid samples are highlighted. The final few chapters serve as a window to new applications of glow-discharge devices as an alternative GC detector, or as an ionization source for ICP. The chapters are extensively illustrated and referenced.

The authors of the chapters are clearly recognized world leaders in their respective fields and, in fact, the entirety of analytical spectroscopy. They are leaders in both hardware development and application areas. Each author has been intentional in discussing their respective topic in relation to alternative methodologies, and as such, the reader should gain a better understanding of the context of the work. The volume will be of reference in the area, and will be of interest to both current and future practitioners.

PARTITION AND ADSORPTION OF ORGANIC CONTAMINANTS IN ENVIRONMENTAL SYSTEMS, by C.T. Chiou, 257 pages. Wiley-Interscience, Hoboken, NJ (2002). ISBN 0-471-23325-0. USD 94.95.

This monograph forms a comprehensive resource on the behavioural characteristics of contaminants in the different environmental compartments. It depicts the processes by which non-ionic organic contaminants are sorbed to natural biotic and abiotic materials. The book focuses on physical principles and system parameters that affect the contaminants distribution in soil and water as well as their uptake by aquatic and terrestrial biota.

A special emphasis is placed on the principles underlying the contaminant sorption to these media and the related medium-contaminant properties, deriving from a range of laboratory and field measurements some relatively simple views and rules that can guide toward a sufficiently accurate account of the activity and fate of contaminants in the environment.

From Chapters 1 to 4, the author provides requisite backgrounds in thermodynamics, and theories of solution and adsorption to assist the comprehension of the following chapters on sorption-related thermodynamic properties. Then, in Chapters 5 to 8, the author describes the processes driving the sorption of non-ionic contaminants to natural substances, usually by a partition process (a solution phenomenon), adsorption process (a surface phenomenon), or both.

The book succeeds in providing a very coherent view that accounts for many observed contaminant uptake phenomena. Therefore, it is an excellent guide to acquaint university lecturers and researchers with the fundamentals of the environmental fate of contaminants before delving into the often confusing and conflicting literature. Although the book is primarily addressed to graduate students and professionals starting out in environmental science and engineering, senior scientists may also find the discussion on certain aspects of the sorption process to be beneficial.

CAPILLARY ELECTROCHROMATOGRAPHY AND PRESSURIZED FLOW CAPILLARY ELECTROCHROMATOGRAPHY. AN INTRODUCTION, by I.S. Krull, R.L. Stevenson, K. Mistry and M.E. Swartz, 240 pages. HNB, New York (2000). ISBN 0-9664286-2-5. USD 54.00.

Although known for almost three decades, these techniques have flourished much more recently. The book begins by describing the basic operations and principles of CEC, as well as pressurised CEC and electro-HPLC. Then, the selection of mobile phases, how these affect electroosmotic flow, and how the proper buffer, organic solvents, pH, etc., can affect the elution time and the overall analytical performance, are discussed in depth, followed by a description of the available instrumentation and specific uses and applications of CEC and PEC. In this respect, recent applications for small molecules, especially pharmaceuticals, and chiral resolution, as well as for biopolymers, including proteins, peptides, nucleosides, carbohydrates and related compounds, clearly illustrate the domains in which these techniques can be useful. The advantages and limitations of these techniques compared with more conventional separation methods are also discussed. Moreover, possible future developments to enlarge the range of applications are described.

Introducing the fundamentals to those first approaching the technique, and providing the criteria for selecting and optimising the analytical conditions for separating a particular structure or group of compounds, the book will serve as a valuable guide for analytical chemists and biochemists, molecular biologists, immunologists, pharmaceutical scientists, and environmental chemists. Overall, the book is easy to read, well illustrated, and referenced.

ADVANCES IN CHROMATOGRAPHY. VOLUME 42, edited by P.R. Brown and E. Grushka, 430 pages. Dekker, New York (2003). ISBN 0-8247-0950-0. USD 195.00.

Maintaining the scientific standards of this well-respected series, this volume illustrates the latest developments in separation science and chromatographic analysis, investigating current trends in chemometric analysis of two-dimensional separations, column technology for capillary electrochromatography, GC-ICP-MS, GC-MS of halocarbons in the environment, microfluids for ultra-small volume biological analysis, proteome analysis, reversed-phase separations, and clinical applications of high-performance affinity.

Volume 42 offers recent strategies to evaluate and assess materials in air, water, soil, and landfill samples; monitor biochemical activity; diagnose diseases at early stages and accelerate drug discovery; examine the role of proteins in cellular signalling, structures, and pathways; and identify errors in sample preparation. Together, these improve

the perspectives on separation techniques in addressing a large variety of problems of societal importance.

HANDBOOK OF ELEMENTAL SPECIATION. TECHNIQUES AND METHODOLOGY, edited by R. Cornelis, 657 pages. Wiley, Chichester, UK (2003). ISBN 0-471-49214-0. £ 150.

Speciation analysis is a rather complex discipline that has been undergoing continual evolution and development for the last 20 years. A fundamental tool for speciation analysis has been the combination of a chromatographic separation technique with atomic spectrometry, permitting a sensitive and specific detection of the target element. Recent impressive progress toward lower detection limits in ICP-MS, toward a higher resolution in separation techniques, especially capillary electrophoresis and electrochromatography, and toward a higher sensitivity in electrospray mass spectrometry for molecule-specific detection at trace levels in complex matrices has allowed new frontiers to be crossed.

The *Handbook of Elemental Speciation* brings together a collection of chapters covering comprehensively different aspects of procedures for speciation analysis at the different levels from sample collection and storage, through sample preparation approaches to render the species chromatographable, and principles of separation techniques used in speciation analysis, to element-specific detection. This already very broad coverage of analytical techniques is completed by electrochemical methods, biosensors for metal ions, radioisotope techniques, and direct solid speciation techniques. Special concern is given to direct speciation of solids, quality assurance and risk assessment, and speciation-relevant legislation.

Each chapter, written by an expert in the field, is a stand-alone reference covering a given facet of elemental speciation analysis from the fundamentals to descriptive applications, with numerous and detailed illustrations. Despite being a multi-author book, the volume as a whole provides an excellent introductory text and reference in the field. With its attractive and careful presentation, this handbook will be a must for undergraduates/graduates in analytical chemistry courses. It will also be a valuable guide for analytical chemists in academia, government laboratories, and industry and regulatory agencies.

INTEGRATED ANALYTICAL SYSTEMS, edited by S. Alegret, 709 pages. Elsevier, Amsterdam (2003). ISBN 0-444-51037-0. EUR 245.00.

This book summarizes the main integration strategies currently found in analytical instrumentation or laboratories, giving a wide and updated panorama of Analytical Chemistry. A general introduction to integrated analytical systems (IAS) is followed by a group of reports (Chapters 2 to 6) describing selected examples of systems in the analytical laboratory using different methodological or conceptual solutions to the integration problem, like solid-phase spectrometric assays, continuous-flow analytical systems, and information-management systems.

A particular case of analytical integration is represented by *sensor systems*, which are presented in the following chapters, including selected reports on chemosensors and biosensors based on either electrochemical transducers or optical transducers. The main emphasis of these chapters is the simplification of the analytical process by integrating the recognition reaction with the measuring step. *Array systems* are dealt

with in Chapters 10 to 12, where analytical systems based on low-selectivity sensors with cross-sensitivities, representing a biomimetic approach to the generation of analytical information, are presented. Also present are analytical microsystems, where the concept of integration has a strong technological component, and some of the IAS described in earlier chapters are now confined to a small space using modern microfabrication techniques. These spatial integration techniques, together with some examples of the microinstruments developed, are described in Chapters 13 to 16. The last chapter of the book reports on the potential held by analytical nanosystems.

This book is written by a group of researchers active within the fields reported, coming from a wide diversity of technological and scientific fields including chemistry, electrochemistry, physics, materials science, microelectronics, electronic engineering, and the instrumentation industry highlighting the multidisciplinary nature of Analytical Chemistry. It is the first of its kind in the specialized literature and certainly will be appropriate for graduate students and researchers in industry and academy to help them acquire a critical vision of some of the current trends in Analytical Chemistry.

SAMPLE PREPARATION FOR TRACE ELEMENT ANALYSIS, edited by Z. Mester and R. Sturgeon, 1286 pages. Elsevier, Amsterdam (2003). ISBN 0-444-51101-6. EUR 395.00.

Sample preparation is a key element of the whole analytical process. This impressive book is an excellent complement to another previously published in the same series on organic analysis and reviewed in this section above (*Sampling and Sample Preparation for Field and Laboratory*).

This volume presents a comprehensive overview of the state of the art of the different aspects of this crucial subject, as the best and most powerful analytical technique cannot provide adequate information if the first step of sample preparation is not performed properly. The 39 chapters of the book are written by international leaders in their fields. The first five chapters deal with general issues related to the determination of trace metals in varied matrices, such as sampling, contamination control, reference materials, calibration and detection techniques, including flame spectrometry, ET-AAS, ICP-AES, ICP-MS, atomic fluorescence spectrometry, mass spectrometric techniques, X-ray fluorescence, spectrophotometric and chemiluminescence techniques and electrochemical methods. The second part of the book deals with extraction and sampling technologies (totalling 15 chapters) providing theoretical and practical hints for users on how to perform extractions by wet digestion, dry ashing, microwave devices, fusion, SFE, ASE, sonication, SPE, chelation, cryotrapping, biotrapping, membrane extraction, flow injection, etc. Subsequent chapters overview seven major representative matrices and the sample preparation involved in their characterization, namely petroleum products and polymers, soils and sediments, food, water, aerosols, industrial wastes and semiconductor materials. This portion of the book is heavily based on the preceding chapters dealing with extraction technologies. The last 10 chapters are dedicated to sample preparation for trace-element speciation (Sn, As, Se, Hg, Pb, Cr, etc.) and sequential extraction.

Practicing analytical chemists will find this book a useful and instructive guide in making sample preparation less challenging and, if needed, directing them to more in-depth sources of information.

ANALYSIS AND FATE OF SURFACTANTS IN THE AQUATIC ENVIRONMENT, edited by T. Kneper, D. Barcelo and P. de Vogt, 966 pages. Elsevier, Amsterdam (2003). ISBN 0-444-50935-6. EUR 395.

In this book, methods and data covering the state of the art of modern analysis and environmental fate of the entire synthetic surfactant spectrum are provided. The first part deals with the analysis of surfactants and consists of three chapters. The chapter dealing with the unequivocal detection of surfactants is mainly devoted to highly sophisticated and established hyphenated mass-spectrometric methods, such as LC-MS and LC-MS-MS. In addition, examples are given for the use of solid-phase micro-extraction coupled to GC-MS and capillary electrophoresis-MS. Sample preparation methods have been thoroughly evaluated for all four groups of surfactants (anionic, non-ionic, cationic, and amphoteric) including their major metabolites. One chapter also addresses quality assurance and interlaboratory studies.

The second part, comprising four chapters, centers on an extensive set of data regarding the different environmental levels of all analysed surfactants and their major degradation products in various countries. The aerobic biodegradation of surfactants is treated extensively, with emphasis on metabolic routes and novel and persistent metabolites formed. In addition, anaerobic degradation and sorption are also covered. The presence of both surfactants and their degradation products in different aquatic matrices, such as wastewater, surface water, and marine water besides biota, is discussed, and its importance for the environment evaluated. Chapters on toxicity and risk assessment are also included and give a complete perspective on the problem of surfactants in the environment.

Researchers, technicians, and policy-makers working in environmental laboratories, regulatory agencies, surfactants and water industry, and sewage-treatment facilities will find in the book detailed and updated information on the different issues concerning the presence of surfactants and their degradation products in the environment.

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