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BOOK REVIEWS

PHYTOREMEDIATION. TRANSFORMATION AND CONTROL OF CONTAMINANTS, edited by S.C. McCutcheon and J.L. Schnoor, Wiley-Interscience, Hoboken, NJ, 2003, 987 pages, £71.95 (ISBN 0-471-39435-1).

This book covers phytotransformation, phytodegradation, rhizosphere degradation and phytocontainment of xenobiotic organic pollutants and selected inorganic compounds that plant enzymatic process transform or mineralize. Therefore, the term phytoremediation is defined to encompass the use of green plants, fungi, algae, bacteria, and microbial mats when one of the following processes are involved in the waste management. The processes include (1) photoautotrophic conversion of sunlight to useful energy and use of atmospheric carbon dioxide to synthesize new biomass, thus fuelling plant and rizosphere microbial control and metabolism of contaminants; (2) green liver metabolism involving transformation, conjugation and sequestration of contaminants and the resulting by-products; and (3) plant transpiration to control the movement of contaminants in water, soil, and air.

To broadly cover the latest advances from fundamental investigation to field testing of concepts, the present book is divided into seven sections. Each section starts with fundamental contributions that define the state of the art and ends with chapters on the applications of fundamental and heuristic concepts in practical settings. The first three chapters (section I) overview the current scientific knowledge and practice including the review of the technical, economic, social and regulatory issues in translating the research to date into practical cleanup applications. Chapter 2 covers the 'green liver' concept for plant metabolism. Section II (five chapters) covers fundamental and important advances involving enzymatic metabolic process, proteomic and genomic bases of plant tolerances, phytotoxicity of selected xenobiotic chemicals and fundamental physiologic processes. Sections III (three chapters), IV (four chapters) and V (five chapters) cover the spectrum of fundamental investigation to field testing for aromatic hydrocarbons, explosives, and chlorinated solvents, respectively. Section VI (four chapters) covers the latest modelling, design, and field application advances starting with the latest phytohydraulic control and modelling that establish the state of the practice then concentrates on applied management techniques for waste waters, leachates and brines. Section VII (seven chapters) present the latest advances in genetic engineering and screening of plants that may be useful in managing atmospheric nitrous

oxides and halocarbon pollution, use of plants to control methyl-*tert*-butyl ether, phytodegradation of cyanide in soil, and rhizodegradation and phytodegradation of dissolved perchlorate. The final two chapters of this section introduce the first plant databases and review current field evaluations of important types of phytoremediation.

This book intends to be a definitive reference for leaders in the research and practice of phytoremediation as well as those students entering in the field. Practising engineers, ecologists, foresters, agronomists, and extension agents; waste site managers; and regulatory experts will find this book to be a definitive reference on the phytoremediation that is possible, feasible, and proven for organic and inorganic contaminants in water, soil and air. Each chapter contains a summary of practical implications.

The coverage of existing and new practices includes wetland construction, land farming, tree and crop plantation, riparian buffer management and a biotechnology-based waste treatment unit process. The book deals with a broad spectrum of organic xenobiotics (hydrocarbons, phenols, surfactants, pesticides, explosives and chlorinated solvents) and few inorganic contaminants. The underlying theme is the *in situ* use of sustainable and renewable biotechnology to protect humans and the environment.

Experts and students in allied fields will also find this book to be a definitive introduction to the science and practice of phytoremediation. Graduate and undergraduate students interested in phytoremediation should find the book to be an indispensable reference to practical case studies as well as definitive process research on why phytoremediation works and where current gaps in knowledge exist. Course instructors and curricula planners in the evolving phytoremediation and ecological engineering programmes of study will find this book adequate to provide a fundamental background.

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SOIL POLLUTION: ORIGIN, MONITORING AND REMEDIATION, by A. Mirsal, Springer, Heidelberg, 2004, €79.95, 252 pages (ISBN 3-540-40143-1).

This graduate-level text treats the subjects related to the interdisciplinary fields of soil pollution and remediation. After a thorough and comprehensive introduction to the relevant fundamentals of the mineralogy, chemistry, and properties of soil, readers are well prepared to understand the biochemical aspects of soil remediation then presented. Soil-monitoring plans, including sampling procedures, and mathematical modelling are covered in a manner enabling readers from various disciplines to acquire the scientific literacy that makes further reading practical, although then the number of references for this is too limited. Moreover, although the book has been conceived as a basic introduction to the field, the general course is too biased towards the geology by the background of the author. However, graduate students and instructors will find it useful for teaching and study.

PESTICIDE RESIDUES IN FOOD AND DRINKING WATER: HUMAN EXPOSURE AND RISKS, edited by D. Hamilton and S. Crossley, Wiley, Chichester, UK, 2003, £95.00, 363 pages (ISBN 0-471-48991-3).

Pesticide Residues in Food and Drinking Water is the latest addition to the Wiley Series in Agrochemicals and Plant Protection. This series brings together current scientific and regulatory knowledge and perspectives on all aspects of the use of chemicals and biotechnology in agriculture.

This book describes in detail the issues surrounding pesticide residues in food and drinking water and, in particular, the issues associated with human exposure and consumer risk assessment. The old questions about how safe food is to eat and water to drink continue to need improved solutions as refinements or approaches in public health risk assessment methods. In broad terms, consumer risk assessment encompasses three areas of scientific disciplines—human toxicology, pesticide residue chemistry and dietary consumption—all of which are explored within this book. Topics covered include the effects of pesticides on the environment, metabolism in crops and livestock, food processing, toxicology, dietary consumption, chronic and acute dietary intakes, natural toxicants, international standards and explaining the risks.

Scientists and professionals working on biochemistry, toxicology, environmental sciences, food processing, dietary and risk analysis, medicine, public administration and communication will appreciate having this very well-documented work in their bookshelves.

CHEMICAL PESTICIDES. MODE OF ACTION AND TOXICOLOGY, by J. Stenersen, CRC Press, Boca Raton, FL, 2004, 276 pages, \$48.99 (ISBN 0-748-40910-6).

This book provides answers to questions such as why pesticides are toxic to the target organism and why they are toxic to some organisms and not to others. This concise and timely introduction describes these compounds according to their mode of action at the cellular and biochemical level. It describes how various poisons interfere with biochemical processes in organisms, not according to the pests they are used against. The book also explores how resistance to pesticides develops, how resistance can be used to illustrate the theory of evolution, and how it can be used to produce herbicide-resistant crop plants. Pesticides as environmental hazards and their translocation and degradation processes are also dealt with. Legal matters and potential environmental problems are also discussed. Finally, it includes an extensive list of relevant literature from classic to cutting edge.

By providing an integrated, yet simple and easy-to-read, description of modern chemical pesticides, the author provides a relevant text for professionals and students in biological disciplines such as biochemistry, medicine, agriculture and veterinary science.

CHIRAL POLLUTANTS. DISTRIBUTION, TOXICITY AND ANALYSIS BY CHROMATOGRAPHY AND CAPILLARY ELECTROPHORESIS, by I. Ali and H. Y. Aboul-Enein, Wiley, Chichester, UK, 2004, 344 pages, £100.00 (ISBN 0-470-86780-9).

The chiral analysis of environmental pollutants is a fairly recent development and attracts interest from, among others, environmental scientists and ecotoxicologists.

Environmental and biological processes are sensitive to chirality. In particular, the uptake and metabolism of enantiomers may be very different, and therefore, their resolution is essential for understanding the fate and toxicity of pesticides and other compounds. Recently, we have published a review of this, but this is the first text to present a detailed methodology on the chiral separation of pollutants.

This book is divided into 10 chapters: the first is an introduction to the principles of chirality; Chapters 2–9 discuss the sources, distribution, biotransformation, toxicity, sample preparation and chiral resolution of environmental pollutants by chromatography, including GC, HPLC, SFC, CEC and TLC, and capillary electrophoresis. In addition, the optimization of experimental parameters for chromatographic and capillary electrophoretic techniques is presented, making this book a useful guide to chiral pollutant analysis. Coverage of the types, structures and properties of chiral stationary phases and their applications for the analysis of chiral pollutants is also presented. The concluding chapter reports on chiral legislation globally and presents perspectives which could guide future research in this area.

In summary, this is a very timely book, well illustrated and referenced (up to 2003) and very pleasant to read, which will be of interest to researchers in biology, analytical chemistry and the environment in industry, academia and governmental regulatory agencies.

REFRACTORY ORGANIC SUBSTANCES IN THE ENVIRONMENT, edited by F.H. Frimmel, G. Abbt-Braun, K.G. Heumann, B. Hock, H.-D. Lüdemann and M. Spiteller. Wiley-VCH, Weinheim, 2002, 546 pages, £150.00 (ISBN 3-527-30173-9).

Refractory organic substances (ROS) are an essential part of the biogeochemical carbon cycle. Wherever there is life on earth, there will also be ROS in the form of poorly biodegradable leftovers of organisms and as a source for new life. Furthermore, it is now beyond doubt that ROS are closely related to the carbon intensity identified as one of the driving forces in the dynamics of greenhouse gas emission, such that ROS play a key role in sustainable development.

This multiauthored book is the result of six years of top-priority research, funded by the Deutsche Forschungsgemeinschaft (DFG) and comprises a unique collection of scientific reports providing new insights into the structures, transformations and interactions of ROS in the environment. The book is divided in sections dealing with the chemical structure and analysis of ROS, including all available techniques for the characterization of this complex organic matter, the biochemical and biological function of ROS in different parts of the environment, with special emphasis on the microbiological pathways, and finally a general description of the large variety of molecular interactions occurring with soil particles and with a number of xenobiotics (e.g. pesticides, PAHs, etc.). It includes the first systematic study of a set of reference samples from Central Europe, originating from a bog lake, soil seepage water, ground water, and from the waste waters of a brown-coal-processing plant and a secondary effluent.

Thus, this work highlights not only the structural features obtained from the application of advanced analytical tools but also the function in anthropogenically

influenced aquatic systems and soils. Although basically written in a journal's format, it will certainly be of special interest to students and researchers in soil sciences.

ORGANIC METAL AND METALLOID SPECIES IN THE ENVIRONMENT: ANALYSIS, DISTRIBUTION PROCESSES AND TOXICOLOGICAL EVALUATION, edited by A.V. Hirner and H. Emons, Springer, Heidelberg, 2004, 328 pages, €99.95, \$129.00 (ISBN 3-540-20829-1).

In recent years, a number of books devoted to various aspects of trace metal speciation and analysis have been published (see *IJEAC*, **82**, 736–738, 2002, and below). The present book is a compilation of papers presented in an international workshop held in Essen in 2002. The wide range of articles on the current state and future perspectives of speciation presented in this book by chemists, biologists, toxicologists, and physicians reflects the multidisciplinary nature of the topic.

While the majority of articles represent original research papers, a number of overviews are given on the environmental and analytical chemistry of organometal(loid) species (chapters 1 and 2) as well as on the geno- and neurotoxicity of these compounds (chapters 11, 14 and 15). The series of articles begins with an introduction to the environmental chemistry of organometallic compounds (chapter 1), followed by an overview on instrumental analytical techniques used in metal(loid) speciation (chapter 2). Particular emphasis is laid on arsenic speciation in environmental systems (chapter 3) and in biomonitoring studies (Ch. 4). Biotransformation processes in micro-organisms (chapters 5, 7 and 8) and in man (chapters 6 and 10) are described, and a chemical modelling study concerning organometallics/DNA interactions is presented (chapter 9). Aspects of genotoxicity (chapters 11–13) and neurotoxicity of organometal(loid)s (chapters 14–16) are discussed in detail. The last two chapters of the book comprise the results of panel discussions on current analytical (chapter 17) and toxicological issues (chapter 18) concerning organometal(loid) compounds.

Disciplines as diverse as biogeochemistry, ecotoxicology, analytical chemistry, microbiology and genetics contribute to estimate the relevant sources and global levels of biogeochemical and anthropogenic emissions of organometal(loid) compounds, and thus to obtain an insight to processes which influence the genesis, as well as the distribution, stability and interactions of organometal(loid) species, which can negatively influence ecosystems and human health.

ORGANOMETALLIC COMPOUNDS IN THE ENVIRONMENT, Second Edition, edited by P. J. Craig, Wiley, Chichester, UK, 2003, 415 pages, £115.00 (ISBN 0-471-89993-3).

Progress in the field of speciation of trace metals in the environment becomes evident when this second edition is compared with the first published in 1986. This completely revised and updated edition treats environmental organometallic chemistry as an integrated and coherent subject area in its own right, bringing together contributions from leading scientists throughout the world.

The Introduction summarizes and explores those properties of organometallic compounds that are relevant to their behaviour and impact in the natural environment. Subsequent chapters cover those elements whose organometallic derivatives are especially important in the environmental context, like mercury, tin, lead, arsenic, antimony, silicon, selenium and others. The natural formation of organometallics from inorganic precursors under environmental conditions is also treated in detail. An important underlying theme running through the work is the biological properties and toxicities of the organometallic species present in the environment. In general, a full speciation approach is taken, where the full molecular identities of the compounds concerned are considered. The present volume is designed as a single-volume source of information for this area, including both the general environmental pathways and the topical aspects of the different organometallic compounds of environmental concern.

Research workers in the fields of organometallic compounds and their environmental impact, as well as those interested in organometallic and environmental chemistry generally, will welcome this new edition. It will also be invaluable as a source book to lecturers teaching courses at undergraduate or graduate level in applied, analytical, industrial, organometallic or environmental chemistry, or in environmental science in general.

ELEMENTS AND THEIR COMPOUNDS IN THE ENVIRONMENT. OCCURRENCE, ANALYSIS AND BIOLOGICAL RELEVANCE, edited by E. Merian, M. Anke, M. Ihnat and M. Stoepler, Wiley-VCH, Weinheim, 2004, 1773 pages, €550.30 (ISBN 3-527-30459-2).

I am particularly pleased to include this three-volume set in this section, to honour the last E. Merian, who was the former review book editor of IJEAC. Since the last edition published in 1991, 'Merian's book' has established itself as the standard reference on this topic. This new edition, presented in three volumes, includes 81 chapters written by 83 experts. New topical features are the focus on nutritional aspects and the coverage of further elements, including non-metals. The newly added chapters cover more than 15 essential elements, as well as some of environmental and nutritional importance. While many chapters of the previous edition have been practically rewritten to accommodate the rapid progress made in this field, all the contributions have been revised and updated to present the current state of knowledge.

The first volume is composed of two parts. Part I deals with Element Distribution in the Environment and consists of 12 chapters ranging from 'Compositions of the Earth's Upper Crust, Natural Cycles of Elements, Natural Resources' to 'From the Biological System of the Elements to Biomonitoring'. Part II discusses in 10 chapters 'Effects of Elements in the Food Chain and on Human Health' and ranges from 'Essential and Toxic Effects of Elements on Microorganisms' to 'Ecogenetics'.

The second volume contains Part III covering all metallic elements, with some chapters carefully updated and/or extended and others new (e.g. Mercury and the Platinum-Group Elements) from the Alkali Metals to Zirconium in 44 chapters of varying length due to the elements' individual essential, eco-chemical and eco-toxicological relevance.

The chapters consists of eight sections: (1) Introduction, (2) Physical and Chemical Properties and Analytical Methods (the latter mainly as a subsection with more details

for elements for which chemical speciation is essential), (3) Sources, Production, Important Compounds, Uses, Waste Products and Recycling, (4) Distribution in the Environment, in Foods and Living Organisms, (5) Uptake, Absorption, Transport and distribution, Metabolism and Elimination in Plants, Animals and Humans, (6) Effects (beneficial and/or adverse) on Plants, Animals and Humans, (7) Hazard Evaluation and Limiting Concentrations, (8) Complete References using the Harvard System.

The third volume contains Part IV with some important metalloids and non-metals from Boron to Tellurium and all Halogens; Part V deals with three chapters: Standards and Regulations Regarding Metals and Their Compounds, Analytical Chemistry of Element Determination (Non-Nuclear and Nuclear) and a new contribution on Analytical Chemistry of Speciation (Principles, Main methods). Part VI contains additional information in a Glossary (Acronyms, Abbreviations, Symbols and definitions), some general tabulated information, and an Index.

This masterwork is indispensable for all those involved in the different aspects of the occurrence of trace elements in the environment, either analytical or environmental chemists, toxicologists or policy-makers. Scientists will find in these pages much relevant information for their purposes.

RADIOACTIVE RELEASES IN THE ENVIRONMENT: IMPACT AND ASSESSMENT, by J.R. Cooper, K. Randle and R. S. Sokhi, Wiley, Chichester, UK, 2003, 473 pages, £39.95 (ISBN 0-471-89924-0).

The purpose of this book is to explore both natural radioactivity and radioactivity arising from the various anthropogenic sources. This book brings together the fundamentals of radiological protection, the techniques used for measuring radioactivity and radionuclides and the methods for modelling the dispersion of radionuclides in the environment. Information on radioactive decay, the interaction of ionizing radiation with matter and the biological effects of radiation and approaches to radiation protection is provided in a form that enables the reader to quickly appreciate its importance to the environment and human health.

Summaries of the effects of past releases, including the Chernobyl accident, are included as well as examples of applications of models to calculate and predict concentrations of radionuclides in our environment.

Other chapters also cover the basics of radiation counting and nuclear instrumentation, together with the most important methods of measuring environmental radiation, and we have also included chapters on obtaining samples and necessary preparation procedures prior to counting. The final chapters provide an introduction to modelling the dispersion of radionuclides in the environment and on methods for conducting the assessment of radiation doses. A bibliography at the end of the book directs the interested reader to texts that deal with the various subject areas in much greater depth and detail.

This book is aimed at all those studying, at undergraduate and graduate levels, radioactivity in the environment and its impact on man. It will also serve as a handbook for workers in the fields of radiochemical analysis and environmental modelling and for scientists, consultants and environmental health and pollution officers who have

to provide radiological data or information for legislative and related purposes. Those readers with the necessary background knowledge and possible expertise in one or more areas of environmental radioactivity and radiation counting will also enjoy reading it.

BIOINDICATORS AND BIOMONITORS, edited by B.A. Markert, A.M. Breure and H.G. Zechmeister, Elsevier, Amsterdam, 2003, 1040 pages, €200.00 (ISBN 0-08-044177-7).

Bioindicators and biomonitors have proven to be excellent tools for assessing the ecosystem and environmental quality based on the complex interactions and interrelations between a large number of organic and inorganic pollutants and biota. The use of bioindicators/biomonitors has been developed from linear assessment (e.g. concentration of an element within an organism to deposition of this element) to integrated thinking on ecosystem levels. In this respect, they may provide information that cannot be obtained by technical measurements alone.

This timely book includes contributions from leading scientists all around the world, as well as national and international policy-makers, giving their points of view on the use of bioindication for their respective purposes. The principles of deriving indicators from presence and performance of organisms in ecosystems and definitions that are used are given. A very important question addressed in the book deals with the kind of information that can be obtained from biological indicators, and the advantages and disadvantages of their applications.

There are several chapters on integrative approaches of bioindicators for policy and regulatory, company and ecosystem management. These are followed by chapters on the use of single species indicators for assessment and predictions of ecosystem quality. Special attention is paid to biomarkers, subcellular systems such as enzymes that can be used to detect effects of compounds on the performance of organisms. Further standard laboratory tests are described, using standardized laboratory organisms to determine effects of toxic compounds or other stressors. Physicochemical methods used for purposes of identification of the presence and abundance of environmental stressors such as toxic compounds or an excess or shortage of nutrients (nitrogen, phosphorus, sulphate, oxygen, trace metals) are described, giving indications on possible effects.

However, only assessment of the presence, abundance and performance of organisms in the field gives an insight into the joint effects of the combination of stress present in the ecosystem. Therefore, the uses of different types of organisms (micro-organisms, lower plants, higher plants, invertebrates, vertebrates) as indicators are discussed in a series of subsequent chapters. Important concepts and future developments for applications of biological indicators and uses of biomonitoring in national and international (monitoring) programmes complete the book. To date, there is no other comprehensive review of these programmes, and obviously this is a major advantage of this volume.

The book is a master guide and assistant to the world of different bioindicators, concepts and strategies, and fills a wide gap on the scientific literature and at the textbook level. It is written for professionals, like conservationists, ecologists, ecotoxicologists, farmers, physiologists, policy-makers, stewards of nature reserves, and students.

GLOBAL ENVIRONMENTAL ISSUES, edited by F. Harris, Wiley, Chichester, UK, 2004, 324 pages (ISBN 0-470-84561-9).

Global environmental problems are complex issues with a network of causes, influenced by a range of factors with differing priorities. It is recognized that science underpins much of what happens in society, and therefore it is important to be able to interpret the environmental and social consequences of scientific developments.

After a general introduction to human–environment interactions, the book explains the causes of changing surface of the earth by climate, sea-level changes, land cover and biodiversity. Next, issues such as the demands for food and energy are considered, followed by how we cope with our impact from the point of view of urbanization and waste production, identifying stakeholders with an interest in each issue and how their perceptions of the problems, and suggestions for the appropriate solutions, vary. Finally, the book introduces the challenges to sustainable development.

Concepts, approaches and issues are well described and exemplified in specific boxes with case studies from the UK, USA, Asia and South America that contextualize theory for students. Suggestions for further reading at the end of each chapter and extensive cross-referencing at the end of the book provide full coverage of the recent literature.

In summary, with an increased interest in the causes and consequences of environmental problems, this book will meet the needs of upper-level undergraduates and Masters students within departments of environmental science and geography, who want a book that tackles the complexity of environmental change.

OIL AND HYDROCARBON SPILLS. III. MODELLING, ANALYSIS AND CONTROL, edited by C.A. Brebbia, Wit Press, Southampton, UK, 2002, 462 pages, \$245.00, €237.00 (ISBN 1-85312-922-4).

This volume contains the edited version of most of the papers presented at the Third International Conference on Oil and Hydrocarbon Spills held on the Island of Rhodes (Greece) in 2002. The book addresses recent advances on different topics related to modelling of trajectory and fate of spills, oil-spill detection and prevention, biological impact of oil pollution, control and clean-up techniques. Although many of the papers refer to problems related to spills at sea or coastal regions, the book also addresses problems of soil pollution due to land spills.

The development of adequate oil-spill contingency plans requires information on a number of physical, chemical and biological phenomena. This book includes papers related to these aspects as well as clean-up measures. Papers in several sections study the assessment of the risk involved and the detection of spills using advanced techniques, such as remote sensing. Finally, several case studies are presented.

COASTAL ENVIRONMENT. V, edited by C.A. Brebbia, J.M. Saval Perez, L. García Andino and Y. Villacampa, WIT Press, Southampton, UK, 2004, 470 pages, \$219.00, €205.50 (ISBN 1-85312-710-8).

This volume contains the papers presented at the Fifth International Conference on Environmental Problems in Coastal Regions and its associated Fourth International

Seminar on Hydrocarbon Spills, Modelling, Analysis and Control, which took place in Alicante (Spain) in 2004.

The Coastal Environment meeting dealt with problems related to monitoring, analysis and modelling of coastal regions, including sea and air phenomena. An important part of the meeting involved discussions on ecological and environmental problems and the issues of water quality. Coastal zones are particularly affected by problems related to population growth and industrial or tourism activities. These developments generate ecological, social and economic pressures which bring different parties into conflict. Effective strategies for management of coastal areas should therefore consider them as dynamic and integrated systems in order to control their environmental quality.

The book also includes papers on hydrocarbon spills, as one of the most serious problems affecting coastal areas. However, spills may also occur at land, so that topics related to soil pollution are also addressed. Papers comprise studies of modelling and the fate of oil slicks as well as the development of adequate oil-spill contingency plans and issues related to prevention and clean-up resources.

LASER IN ENVIRONMENTAL AND LIFE-SCIENCES, edited by P. Hering, J. P. Lay and S. Stry, Springer, Berlin, 2004, 343 pages, €89.95, \$109.99 (ISBN 3-540-40260-8).

Laser spectroscopy is the basis of many recent analytical techniques. These are more sensitive and reach lower detection limits, but they also provide more detailed information on the species under investigation and their interactions with the environment. Also, in life sciences, revolutionary new techniques for diagnostics have been introduced which allow a thorough investigation of biological processes in plants and their dependence on environmental conditions. In particular, for medical applications, these new, mainly non-invasive techniques have influenced medical diagnostics and treatment considerably.

This book deals with these very interesting interdisciplinary areas. Prominent scientists report on their current research; demonstrate that multi-disciplinary applications are possible; and employ examples on how existing environmental diagnostic methods have found their way into the life sciences.

The book is organized into four sections: remote sensing of the atmosphere, including analysis of three-dimensional aerosol distributions by means of digital holography, detection techniques for liquid and solid samples, like laser-induced fluorescence spectroscopy for *in situ* analysis of contaminated soils, applications to gaseous substances and aerosols and finally applications in biology and medicine. Each section is opened by a review article, which hints at the relations between the following articles and surveys the literature.

Biologists, medical people or environmentalists, should recognize the new possibilities opened by these techniques. This volume may also serve to start more initiatives for a closer cooperation between physicists, chemists, biologists and medical people.

ATOMIC SPECTROSCOPY IN ELEMENTAL ANALYSIS, edited by M. Cullen, Blackwell, Oxford, 2004, 310 pages, £99.50 (ISBN 1-84127-333-3).

This volume provides an overview of the complete range of atomic spectroscopy techniques available to the elemental analyst offered by international specialists. Each chapter presents the key principles of a technique, descriptions of the instrumentation, discussion of interferences and representative applications.

The book begins with a chapter on method validation, written in such a way that it is of general relevance to any of the techniques covered in later chapters. Chapters 2 and 3 address, respectively, inductively coupled plasma mass spectrometry (ICP-MS) instrumentation and operation, and inductively coupled plasma atomic emission spectroscopy (ICP-AES). A useful section on pre-concentrations methods is also included. Chapter 4 covers analytical glow discharges. The techniques of glow-discharge optical emission spectroscopy (GC-OES) and glow-discharge mass spectrometry (GD-MS) are explained, and applications for both conducting and non-conducting samples are included. Chapter 5, on microwave plasma atomic emission spectroscopy, describes the application of microwave-induced plasmas (MIP) as detectors—mainly in the area of gas chromatography, but liquid and supercritical fluid applications are also considered. Chapter 6 covers the technique of X-ray fluorescence spectroscopy (XRF), discussing the principal components of wavelength dispersive (WD) and energy-dispersive (ED) methods. In Chapter 7, electro-thermal atomic absorption spectroscopy (ETAAS) is examined. Chapter 8, on flame atomic absorption spectroscopy, brings a classic technique up to date, with references to new applications in a variety of sectors, including hydride and cold vapour methodologies. Chapter 9, on chemometrics, considers experimental design, multivariate statistics and data analysis, as applied to atomic spectroscopy.

The book is intended as an up-to-date source of reference for analytical chemists, environmental chemists and scientists working in the field of elemental analysis, in both academic and industrial laboratories. However, it is particularly suited for graduate courses.

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