

This article was downloaded by:

On: 17 January 2011

Access details: *Access Details: Free Access*

Publisher *Taylor & Francis*

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



## International Journal of Environmental Analytical Chemistry

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t713640455>

### Book reviews

To cite this Article (2006) 'Book reviews', International Journal of Environmental Analytical Chemistry, 86: 15, 1175 – 1189

To link to this Article: DOI: 10.1080/03067310600922063

URL: <http://dx.doi.org/10.1080/03067310600922063>

## PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.informaworld.com/terms-and-conditions-of-access.pdf>

This article may be used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

## Book reviews

ENVIRONMENT (5th edition), by P.H. Raven and L.R. Berg, 672 pages, Wiley, Hoboken, NJ (2006), ISBN 0-471-70438-5, £64.50.

*Environment*, 5th edition, provides the reader with a very useful guide to understanding, appreciating, and preserving the Earth's environment, blending solid scientific content on the remarkable complexity and precise functioning of natural ecosystems with many examples of real-life case studies, problems and solutions, and a highly pleasant presentation, with extensive use of illustrations and diagrams.

Part 1, *Humans in the Environment*, introduces environmental science and current environmental concerns. The two chapters in this section develop the scientific process and examine how human endeavours such as economies, government policies, and environmental ethics affect the environment. The concept of sustainable development is introduced and revisited throughout the book, particularly in the context of sustainable cities, sustainable water and soil uses, sustainable manufacturing, forest management and agriculture, and sustainable consumption. Part 2, *The World We Live In*, provides a detailed introduction to basic ecological principles. This part, which consists of five chapters, is organized around the ecosystem, which is the fundamental unit of ecology.

Part 3, *A Crowded World*, discusses the principles of population ecology and emphasizes the fact that human populations comply with the same principles of population ecology as other organisms. The three chapters in this part also examine urbanization and other sociological and cultural factors that affect human population growth. Part 4, *The Search for Energy*, considers the environmental impact of the human quest for energy. This part, which consists of three chapters, discusses key issues associated with the use of fossil fuels, nuclear power, and renewable energy sources. Part 5, *Our Precious Resources*, examines the overuse and abuse of our natural resources. The six chapters in this section explore resource issues and dilemmas involving water, soil, minerals, biological resources, land, and food production. Part 6, *Environmental Concerns*, has five chapters that review the effects of local, regional, and global pollution, with special reference to the problems associated with air pollution, acid deposition, global climate change, stratospheric ozone destruction, water and soil pollution, pesticide pollution, and solid and hazardous wastes. Part 7, *Tomorrow's World*, concludes the book with a single chapter that presents the opinions of the authors on social responsibilities, identifying some of the most critical issues that must be grappled with today to assure a better tomorrow.

As important as the written content is the incorporation of an innovative learning system that has learning objectives at the beginning of each major chapter section and review questions at the end of the section to give students the opportunity to test their comprehension of the learning objectives. Additional online information and resources are also provided. Together, these ancillaries provide instructors and students with interesting and helpful teaching and learning tools and take full advantage of both electronic and print media. At the end of each chapter's introduction, students are directed to visit <[www.wiley.com/college/raven](http://www.wiley.com/college/raven)> where they can watch, read, and listen to local and global news stories relating to a chapter. The Instructor's Manual provides over 70 creative ideas for in-class activities, lecture outlines, and PowerPoint presentations designed for use in the classroom.

This masterwork, intended as an introductory text for undergraduate students, is indispensable for all those involved in environmental teaching and learning, and certainly should be in all specialized libraries and, particularly, in bookshelves of departments dealing with environmental issues from both the scientific and social perspectives.

**ANALYTICAL TECHNIQUES FOR ATMOSPHERIC MEASUREMENT**, edited by D. Heard, 528 pages, Blackwell, Oxford (2006), ISBN 1-405-12357-5, £99.50, \$199.99.

This book provides a detailed coverage of the instruments developed to make measurements of atmospheric composition: how they work, their strengths and weaknesses for a particular task, the platforms on which they have been deployed, how they are calibrated, etc. The chapters contain a high level of instrumental detail not normally found in the literature due to lack of space in regular journal articles.

The book explains the fundamental physical principles upon which the instrumental techniques are based. For instance, what properties of molecules can be exploited to enable their detection? What limits the sensitivity and accuracy of a given instrument, and what information can be gained from its use? The book attempts to illustrate the challenge to measure quantitatively trace atmospheric constituents that are at the heart of atmospheric chemistry, and responsible for many of the problems facing society today; for example, the warming of our atmosphere, the destruction of the ozone hole, and the formation of urban air pollution and acid rain. Measurements of the composition of our atmosphere range from the Earth's surface to the edge of space.

The book is designed to appeal to two major types of audience. One class of readers is that who wish to gain a general understanding of instrumentation for measurement of atmospheric composition, the fundamental principles upon which techniques depend, their major capabilities, together with highlights of the important results and the advances in understanding that have resulted—but without wanting a detailed discussion of the underlying atmospheric chemistry or physics. The chapters have been written so that this information is easily retrievable and is accessible to the non-expert. The other class of readers is the scientists or instrument developers who are more experienced, and who will be interested in the finer detail of specific instruments, and latest developments, and perhaps wish to discover if a particular technique was suitable for a new measurement.

ANALYSIS OF SEAWATER, A GUIDE FOR THE ANALYTICAL AND ENVIRONMENTAL CHEMIST, by T.R. Crompton, 532 pages, Springer GmbH, Heidelberg, Germany (2006), ISBN 3-540-26762-X, €149.95, £115.50.

This book covers all aspects of the analysis of seawater using both classical and the most advanced recently introduced physical techniques, which provide adequate sensitivity for true ultra-trace metal determinations.

Chapter 1 discusses a very important aspect of seawater analysis, namely sampling. Chapters 2 and 3 discuss the determination of anions. Suitable modifications of many of the classical procedures are discussed that are amenable to seawater. Dissolved gases in seawater are of interest in certain contexts, and their determination is discussed in chapter 4. Chapters 5 and 6 discuss the application of new techniques such as atomic absorption spectrometry, inductively coupled plasma mass spectrometry, X-ray fluorescence spectrometry, neutron activation analysis, voltammetric techniques, and others. In the first part of the chapter, elements are discussed singly in alphabetical order, then as groups of elements, because the newer techniques often cover ranges of elements. Finally, there is a section on metal pre-concentration techniques. The monitoring of levels of radioactive elements in the seawater is discussed in chapter 7. Chapters 8 and 9 cover the determination of a wide range of organics in seawater, while chapter 10 covers organometallic compounds. Finally, chapter 11 discusses the present state of knowledge on the determination of various oxygen demand parameters and non-metallic elements in seawater.

While the book will be of obvious interest to anyone concerned with sea water environmental protection, it is believed that it will also be of interest to other groups of workers, including river Authorities who have to implement legal requirements regarding seawater pollution, oceanographers, and fisheries experts. The book will also be of interest to practising analysts and, not least, to the scientists and environmentalists.

ANTIFOULING PAINT BIOCIDES, edited by I. Konstantinou, 266 pages, Springer GmbH, Heidelberg, Germany (2006), ISBN 3-540-31404-0, €139.95, £107.50.

The contamination of the aquatic environment by antifouling compounds has been a topic of increasing importance during the last years. This volume describes the advances regarding antifouling paint biocides and provides thorough evaluation of research and information on major topics such as occurrence and levels, environmental fate and behaviour, analytical techniques and methods for the monitoring and control in various matrices, environmental modelling, input estimation, ecotoxicological effects and risk assessment, placing emphasis on the current knowledge during the last 10 years.

The major classes of antifouling active biocides are discussed including the old-fashioned organotin compounds, the modern organic booster biocides, like Irgarol 1051, sea-fine 211, dichlofluanid, chlorothalonil, zinc pyrithione, diuron, TCMS pyridine, TCMTB, zineb, etc., and the promising naturally antifoulant products. It also highlights the gaps in scientific knowledge where more research and monitoring efforts are needed, especially in the field of ecotoxicology and long-term risk assessment. Therefore, the reader will get a balanced view of this developing field. Chapters were written by leading experts in their field who critically surveyed all major areas of progress.

This volume constitutes an important resource for researchers, students, environmental managers, and professionals interested in this interdisciplinary field.

**ENVIRONMENTAL RISK ASSESSMENT**, by I. Lerche and W. Glaesser, 343 pages. Springer GmbH, Heidelberg, Germany (2006), ISBN 3-540-26249-0, €99.95, \$139.00.

This book deals with environment and human risk problems caused by contamination that have occurred and that are still ongoing. Furthermore, it highlights the impact of contaminants on human health, in some cases ultimately leading to death, as well as the anthropogenic exacerbation of natural processes. The purpose of the volume is to show that, even with the natural and anthropogenic environmental problems we already know about, the procedures for investigating them and then suggesting both remediation methods as well as preventative measures are not at all obvious. Many options are possible; many risks related to health and to further pollution concerns have to be considered before one can decide on a particular remediation procedure.

The applications chosen to illustrate these points are taken from a variety of areas and with different causes. In this way, one can see that the environmental problems are major and worldwide, and often have no social, economic, or politically acceptable solutions, even when scientific solutions are available.

Each chapter is self-contained and has a summary at its beginning so that one can obtain the purpose of the chapter before commencing to read the chapter. Readers who are interested in particular subjects may then easily skip to remaining chapters. The disadvantage of this form of communication is that some figures have to be repeated in different chapters.

The level of the book is set such that students actively involved in learning how to analyse environmental problems should have little difficulty in understanding the case histories. For professionals in the field, seriously involved in remediation efforts, this volume provides a detailed set of procedures to analyse the scientific consequences of environmental problems. The volume should also be of use to decision-makers in both government and private industry who are actively involved in balancing the social, economic, political, scientific, and health issues for the best benefits of the population.

**SAMPLING FOR NATURAL RESOURCE MONITORING**, by J. de Gruijter, D. Brus, M. Bierkens and M. Knotters, 332 pages, Springer GmbH, Heidelberg, Germany (2006), ISBN 3-540-22486-6, €129.95, \$169.00.

This book presents the statistical knowledge and methodology of sampling and data analysis useful for spatial inventory and monitoring of natural resources. The authors pay much attention to how statistical methodology can be employed and embedded in real-life spatial inventory and monitoring projects. Thus, they discuss in detail how efficient sampling schemes and monitoring systems can be designed in view of the aims and constraints of the project.

Broadly speaking, monitoring draws on three distinct statistical methodologies: sampling theory, time-series analysis, and geostatistics. Many books are available on each of these fields, but they lack the methodological scope that is generally needed in monitoring. Furthermore, they rarely give enough help to practitioners who want to know how to make a proper selection of methods from these fields, and how to

integrate them into a monitoring scheme. The present book provides the statistical methodology of monitoring that gives applied scientists' sufficient guidance on how to design a monitoring scheme, which design decisions have to be taken, and how to optimize the sample selection. It covers classical sampling methodology, sampling in time and in space, as well as in space–time, at global and local levels.

Although the focus is on practitioners in the field of natural resource monitoring rather than statisticians, basic statistical knowledge is required for a proper understanding of the methodologies described. If, on the basis of this book, an advanced method is selected, the assistance of an applied statistician will usually be necessary.

THE CASPIAN SEA ENVIRONMENT, edited by A. Kostianoy and A. Kosarev, 271 pages, Springer GmbH, Heidelberg, Germany (2005), ISBN 3-540-28281-5, €149.00.

The systematic description of the knowledge accumulated on the physical oceanography, marine chemistry and pollution, and marine biology of the Caspian Sea forms the basis of this book. It presents the principal characteristic features of the environmental conditions of the sea and their changes in the second half of the 20th century. Special attention is paid to socio-economic, legal, and political issues in the Caspian Sea region. This book is based on numerous observational data collected by the authors of the chapters during sea expeditions, on the archive data of several Russian oceanographic institutions, as well as on the broad scientific literature mainly published in Russian.

After a general introduction, chapter 2 is devoted to a brief description of physico-geographical features of the Caspian Sea. Chapter 3 presents the general particularities of the thermohaline structure and circulation of the waters of the sea. Chapter 4 describes the seasonal and interannual variability of the sea surface temperature in various parts of the sea based on satellite data. Chapters 5 and 6 discuss the natural chemistry of the Caspian Sea and general information on the chemical contamination of the seawater and bottom sediments. Chapter 7 is devoted to existing research on the seasonal and interannual variability of remotely sensed chlorophyll patterns. Chapters 8–10 review the marine biology of the Caspian Sea focusing on its biodiversity, introduced species, and resources. Chapter 11 addresses the history and present condition of Kara Bogaz-Gol Bay. Chapter 12 deals with the general ecological problems in the Caspian Sea. Economic and international legal dimensions are discussed in chapter 13, and the book concludes with a review of modern environmental conditions of the Caspian Sea.

This book is intended for specialists working in various fields of physical oceanography, marine chemistry, pollution studies, and biology, and for specialists studying a wide scope of environmental problems from regional climate to mesoscale processes, or from remote sensing of the seas to numerical and laboratory modelling.

THE RHINE, edited by T.P. Knepper, 389 pages, Springer GmbH, Heidelberg, Germany (2006), ISBN 3-540-29393-0, €184.95, £142.50.

The book presents a comprehensive overview of the Rhine River, beginning with hydrological facts, the development of water protection protocols during the last

30 years, and early warning strategies. Additionally, the book describes many aspects of water quality from the Rhine but also from alpine lakes (Lake Constance and Zurich), the tributaries, estuary, and adjacent coastal waters connected with the river.

As the Rhine has been one of the best investigated water bodies worldwide, a great deal of information exists on organic micropollutants, such as pesticides, pharmaceuticals, synthetic aromatic sulphonates, aminopolycarboxylate chelating agents, industrial chemicals and by-products from chemical syntheses, MTBE, natural and artificial radioactivity, and the long list of priority pollutants of recent concern, such as the so-called emerging contaminants. In this respect, the book collects detailed contributions on modern analysis, monitoring data and the environmental fate of this wide spectrum of micropollutants.

The content of this book is suitable for analysts, industries, utilities, and politicians who wish to gain knowledge from concise but comprehensive information in all fields concerning the Rhine, as such, or as examples to be applied elsewhere.

**ESTUARIES**, edited by P.J. Wangersky, 305 pages, Springer, Heidelberg, Germany (2006), ISBN 3-540-00270-7, €139.95, \$179.00.

The book gives a comprehensive overview on different aspects of the biogeochemistry of estuaries from a variety of environments, from the tropics to the Arctic. In most cases, the courses of these rivers have been altered by dams or diversions, and the results of these changes and the nature of the estuary are also discussed. The Amazon, for instance, is a rare example of an estuary where the gradation from fresh water to sea salinities takes place outside the estuary proper. The Mackenzie exhibits ice damming at the mouth, where it enters the Arctic Ocean, at a time of year when its more southerly beginnings are free-flowing and delivering the melt water from the winter's snows. In the Nile, the longest record of a river's annual cycle can be found, and this is an example of how changes can occur as a result of human intervention. Of particular interest is the comparison between the Huon and Derwent Rivers in Tasmania. These rivers are not very far apart and share many of the same biological and geological characteristics. However, only a minor amount of settlement and subsistence farming has taken place along the Huon, while a major city, along with the usual industrial and port facilities, can be found on the banks of the Derwent. The many contrasting environments found in the St. Lawrence estuary make it particularly attractive for the study of biogeochemical processes. Possibly no river has been more extensively manipulated than the Danube. The effects of these changes on the adjacent coastal areas of the Black Sea are also discussed. The Po is another river whose heavy nutrient and pollutant load, a result of the highly agricultural Po Valley, affects not only its estuarine life, but also the sea into which it flows. The last chapter of the book includes a discussion on the role of particle sorption properties in the fate of trace metals in microtidal estuaries, with the example of cadmium. A note which is sounded in several of the chapters concerns the increase in variability in weather over the past 10 or 20 years.

The book is well updated and extensively illustrated to show the complex geochemistry of estuaries and the human pressures that may impair their equilibrium. It is a reference book for environmental scientists, scholars, as well as policy makers, concerned by the study and management of these key ecosystems.

**MARINE ORGANIC MATTER: BIOMARKERS, ISOTOPES AND DNA**, edited by J.K. Volkman, 390 pages, Springer, Heidelberg, Germany (2006), ISBN 3-540-28401-X, €194.95, £150.00.

A characteristic feature of today's marine science is the need for multidisciplinary approaches. This book brings together 10 chapters on the use of lipid biomarkers, pigments, isotopes, and molecular biology to ascertain the sources and fate of organic matter (both natural and pollutant) in the sea and underlying sediments.

The book opens with a broad overview of the carbon cycle in the sea followed by chapters on lipid, pigment, and DNA biomarkers for studying its sources and sinks. Specific environmental systems can be recognized using biological markers such as the example discussed here for the anoxia in the photic zone of the water column. Molecular markers can also be used for recognizing the atmospheric transport of terrestrial organic matter to the sea, as discussed in another chapter. Isotopic tracers of the carbon and nitrogen cycles are also reviewed in detail and their utility illustrated with several case studies. Much of this organic matter is remineralized (i.e. becomes food for consumers), but a small proportion sinks to the depths, and an even smaller proportion becomes incorporated into the sedimentary record either as the original biochemicals or as diagenetically altered forms. Distributions of biomarkers in sediments can provide a great deal of information about the type of environment present at the time of deposition and the related water column processes.

The footprints of man can also be evidenced using the molecular-marker approach. Biomarkers are used to identify pollution of the oceans together with the many hundreds of manufactured compounds that are unfortunately found throughout the marine realm, as shown in the last chapter.

The authors are experts in their fields, and they have been able to provide an overview of the state of the art and knowledge gaps with sufficient detail to satisfy the needs of specialists and non-specialists alike. Marine chemists and biologists, physical oceanographers, and modellers will enjoy reading the book and keeping it as a reference in their work.

**PERSISTENT ORGANIC POLLUTANTS IN THE GREAT LAKES**, edited by R. Hites, 457 pages, Springer, Heidelberg, Germany (2006), ISBN 3-540-29168-7, €239.00, £184.00.

The environment around the Laurentian Great Lakes region has been adversely affected over the decades by agricultural runoff, urban waste, industrial discharge, landfill leachate, and atmospheric deposition. Although there have been some improvements over the last 20 years, persistent toxic organic pollutants are now a serious problem. This book brings together what is known about the major classes of these pollutants in the Great Lakes. Each chapter reviews the knowledge of the extent of contamination of the various parts of the Great Lakes ecosystem (air, water, sediment, fishes, birds, etc.), what is known about the trends over time of this contamination, and knowledge about the mechanisms by which these pollutants are mobilized in the lakes. Detailed information is presented on polychlorinated biphenyls, polychlorinated dibenzo-*p*-dioxins and dibenzofurans, pesticides, toxaphene, polychlorinated naphthalenes, polycyclic aromatic hydrocarbons, brominated flame retardants, and perfluoroalkyl acids.



These reviews make this volume an invaluable resource for all those involved in environmental research and teaching, monitoring, and decision making.

**ANALYTICAL ELECTROCHEMISTRY** (3rd edition), by Joseph Wang, 250 pages, CRC Press, Taylor & Francis Group, Boca Raton, FL (2006), ISBN 0-471-67879-1, €79.20, £55.95.

This new edition continues to provide readers with the latest panorama of electroanalytical techniques and devices, offering a balance between voltammetric and potentiometric techniques. Emphasizing electroanalysis rather than physical electrochemistry, readers gain a deep understanding of the fundamentals of electrode reactions and electrochemical methods. Moreover, readers learn to apply their new-found knowledge and skills to solve real-world analytical problems.

The first chapter is devoted to fundamental aspects of electrode reactions and the structure of the interfacial region. Chapter 2 discusses electrode reactions and high-resolution surface characterization, using techniques ranging from cyclic voltammetry to scanning probe microscopies. Chapter 3 gives an overview of finite current-controlled potential techniques. Chapter 4 describes the electrochemical instrumentation and electrode materials, including new and modified microelectrodes. Chapter 5 deals with the principles of potentiometric measurements and various classes of ion-selective electrodes, while chapter 6 is devoted to the growing field of chemical sensors, including biosensors, gas sensors, microchip devices, and sensor arrays. Numerous up-to-date references, covering the latest literature, are given at the end of each chapter.

Among the new topics covered, readers will discover DNA biosensors, impedance spectroscopy, detection of capillary electrophoresis, diamond electrodes, carbon-nanotube and nanoparticle-based arrays and devices, large-amplitude AC voltammetry, solid-state ion-selective electrodes, ion-selective electrodes for trace analysis, and lab-on-a-chip devices.

The book is recommended for graduate-level courses in electroanalytical chemistry and as a supplement for upper-level undergraduate courses in instrumental analysis. The text also meets the reference needs for any industry, government, or academic laboratory engaged in electroanalysis and biosensors.

**BASIC CONCEPTS OF ENVIRONMENTAL CHEMISTRY** (2nd edition), by Des W. Connell, 462 pages, CRC Press, Taylor & Francis, Boca Raton, FL (2005), ISBN 1-56670-676-9, £29.95.

Environmental chemistry is the study of sources, reactions, transport, and fate of chemical entities in the air, water, and soil environments, as well as their effects on human health and the natural environment. This book assumes only a basic prior knowledge of chemistry and is designed as a textbook for courses in environmental chemistry. The objective of this fully revised edition is to provide knowledge of environmental chemistry based on a series of theoretical principles, rather than as a set of rambling facts. It aims to give students not just knowledge of environmental chemistry but an understanding of how and why processes in the environment occur.

*Basic Concepts of Environmental Chemistry* provides a theoretical basis for the behaviour and biological effects of natural chemical entities and contaminants in natural systems, concluding with a practical focus on risk assessment and

the environmental management of chemicals. The text uses molecular properties such as polarity, water solubility, and vapour pressure as the starting-point for understanding the environmental chemistry of various contaminants in soil, water, and the atmosphere. It explains biological processes such as respiration and photosynthesis, and their relationship to greenhouse gases. The book then introduces environmental toxicology and describes the distribution, transport, and transformation of contaminants, including PCBs and dioxins, plastics, petroleum and aromatic hydrocarbons, soaps and detergents, and pesticides. The author highlights the relationship between specific chemical properties and their environmental and biological effects. Other topics discussed include partition behaviour, fugacity, and genotoxicity, particularly involving carcinogens.

This is a practical textbook for teaching students the basic concepts of chemistry in the framework of the environment and a practical reference for anyone involved in the management and disposal of industrial chemicals and emissions, occupational health and safety, and the protection of the natural environment.

**ECOTOXICOLOGICAL TESTING OF MARINE AND FRESHWATER ECOSYSTEMS: EMERGING TECHNIQUES, TRENDS AND STRATEGIES**, edited by P.J. den Besten and M. Munawar, 296 pages, CRC Press, Taylor & Francis, Boca Raton, FL (2005), ISBN 0-849-33526-4, £85.00.

The book examines the use of selective biosensors, bioassays, bioaccumulation modelling, biomarkers, gene expression analysis, and other techniques that enable scientists to measure cellular, sub-cellular, and molecular effects of low-level contaminants on various organisms and evaluate changes caused by over-exploitation, habitat modification, catchment runoff, polluting emissions, and even global warming. The chapters describe various ways to assess species diversity, organism population trends, and exposure routes to reveal tangible consequences of sediment or water toxicity in both freshwater and marine waters. A chapter is dedicated to the role of remote sensing technologies in monitoring, prediction, and management of changes within coastal ecosystems, along with improvements in information technology and data processing that allow for the assessment of spatial variability. The last chapter summarizes the current status of techniques and strategies. Several appendices highlight the strengths and limitations of various techniques and provide references to additional literature.

The book also explores multi-tiered approaches to making recommendations for the preservation, enhancement, and restoration of ecosystem functions as well as risk perception and communication strategies for investigators, policy makers, government agencies, and the public. Contributed by leading field experts, this book is useful for post-graduate students, researchers, and regulatory professionals involved in environmental toxicology, ecosystem health, ecology, pollution monitoring, and freshwater and marine science.

**FLUORESCENCE SENSORS AND BIOSENSORS**, edited by R.B. Thompson, 416 pages, CRC Press, Taylor & Francis, Boca Raton, FL (2005), ISBN 0-824-72737-1, £79.99.

*Fluorescence Sensors and Biosensors* emphasizes the most recent developments and emerging technologies with the broadest impacts in prominent fields such as

fluorescence-activated cell sorting, DNA sequencing, high-throughput screening, and clinical diagnostics.

Roughly grouped under three headings, namely new recognition or transduction approaches, other new technology, and selected applications, the text begins with the development of aptamers (oligoribonucleotides) for sensing and biorecognition techniques based on periplasmic binding proteins. The following chapters review the molecular beacon approach for DNA recognition, which has become a dominant method for transducing the recognition of DNA sequences in array formats, describe resonance energy transfer (FRET) in sensing, and present the use of carbonic anhydrase recognition platform for metal-ion determination and imaging. The book explores the advantages of fluorophores, fluorescent labels, sensor and assay construction, metal-enhanced fluorescence, phosphorescent labels, and lab-on-a-chip applications. It also describes new anion-selective fluorescent probes used as analytes in clinical determinations. The final chapters highlight the application of fluorescence sensing technology to several practical problems, such as the development of planar waveguide biosensors for clinical diagnostics and the adaptation of fluorescence-based sensing approaches for biochemical production by fermentation. The book also discusses the measurement of analytes, such as free zinc ions, at ultratrace levels in biological specimens.

Written by internationally renowned authors in their fields, *Fluorescence Sensors and Biosensors* provides an up-to-date account of fluorescence-based sensors focused on practical applications in biotechnology, analytical chemistry, and biomedicine.

**PHYSICAL-CHEMICAL PROPERTIES AND ENVIRONMENTAL FATE FOR ORGANIC CHEMICALS** (2nd edition), by D. Mackay, Wan Ying Shiu, Kuo-Ching Ma, Sum Chi Lee, 4182 pages (4 volumes), CRC Press, Taylor & Francis, Boca Raton, FL (2006), ISBN 1-56670-687-4, £570.00.

This handbook is a compilation of relevant data on physical-chemical properties of organic chemical substances, that are used for understanding or modelling their environmental fate as they are transported and transformed in the multimedia environment of air, water, soils, sediments, and their resident biota. These fate processes determine the exposure experienced by humans and other organisms, and ultimately the risk of adverse effects.

Reported values are disperse and often difficult to select and assess. To assist the environmental scientist and engineer, this handbook contains compilations of physical-chemical property data for about 1250 compounds, classified as aliphatic and aromatic hydrocarbons, including PAHs, halogenated aliphatic and aromatic hydrocarbons, including PCBs, chlorinated dibenzo-*p*-dioxins and dibenzofurans, ethers, alcohols, aldehydes and ketones, carboxylic acids, esters, phenolic compounds, nitrogen and sulphur compounds, herbicides, insecticides, and fungicides.

A valuable enhancement to this edition is the inclusion of extensive measured temperature-dependent data for the first time. The data focus on water solubility, vapour pressure, and Henry's law constant but include octanol/water and octanol/air partition coefficients where available. They are provided in the form of data tables and correlation equations as well as graphs. Moreover, the first chapter demonstrates how data may be taken a stage further and used to estimate

likely environmental partitioning tendencies. The results are presented numerically and pictorially to provide a visual impression of likely environmental behaviour.

This new edition of the handbook will be invaluable to environmental scientists and engineers, and to students and teachers of environmental science. Its aim is to contribute to better assessments of chemical fate in our multimedia environment by serving as a reference source for environmentally relevant physical–chemical property data of classes of chemicals and by illustrating the likely behaviour of these chemicals as they migrate throughout our biosphere.

**PRACTICAL GUIDE TO CHEMOMETRICS** (2nd edition), edited by P. Gemperline, 552 pages, CRC Press, Taylor & Francis, Boca Raton, FL (2006), ISBN 1-574-44783-1, £99.00.

Drawing in real-world examples, *Practical Guide to Chemometrics* offers an accessible introduction to application-oriented multivariate methods of data analysis and procedures that are highly beneficial to solving a variety of problems using analytical chemistry and statistics.

Rather than overshadowing the concepts with theoretical background, this book uses application-oriented examples to illustrate how chemometrics techniques can be applied to complex scenarios with multiple and dynamic variables. Multivariate methods and procedures that have been found to be extraordinarily useful in analytical chemistry applications are introduced with minimal theoretical background. Numerous worked examples using MATLAB<sup>®</sup> code are offered, to illustrate how easily these techniques can be adapted to various experimental scenarios. The use of SIMCA, Pirouette, GRAMS/32, PLS Toolbox, Unscrambler, and DX6 computer tools is also described.

The book presents a diverse selection of topics that include sampling, modelling, experimental design, calibration, pattern recognition, data-analysis techniques, algorithms, and error. This second edition has been completely revised to feature new chapters on principal-component analysis, self-modelling curve resolution, and multi-way analysis methods. It also includes expanded material on normal distributions, sampling theory, signal processing, and digital filtering. Each chapter includes a summary, solutions to problems, recommended reading, and key references for the applications and methods introduced.

*Practical Guide to Chemometrics* continues to offer a reliable source of useful information in a style that is accessible to all levels of students, professionals, and researchers involved in analysing scientific data. In summary, the aim of the book is to illustrate chemometric methods through practical examples in a style that makes the material accessible to a broad audience of non-experts.

**PRINCIPLES OF ECOTOXICOLOGY** (3rd edition), C.H. Walker, S.P. Hopkin, R.M. Sibly, D.B. Peakall, 315 pages, CRC Press, Taylor & Francis, Boca Raton, FL (2005), ISBN 0-849-33635-X, £29.99.

*Principles of Ecotoxicology* (3rd edition) discusses the fundamental chemical and ecological nature of pollution processes while identifying the major classes of pollutants

and their environmental fate, emphasizing principles rather than practice. A major theme of the new edition is how the concepts discussed can contribute to improved methods of environmental risk assessment.

The book encompasses three parts, dealing with pollutants and their fate in ecosystems, and effects of pollutants on individual organisms and on populations and communities. The first chapter include a description of the major classes of pollutants that have recently received attention (e.g. inorganic ions and anions, hydrocarbons, PCBs, PCDD/PCDFs, PBBs, organochlorine and organophosphorous pesticides, carbamates, pyrethroids, neonicotinoids, phenoxy herbicides, anticoagulant rodenticides, detergents, chlorophenols, ethinylestradiol, pharmaceuticals, organometallic compounds, and radioactive isotopes), plus a short section on naturally occurring poisons and the history of chemical warfare, together with overviews on the routes by which they enter the ecosystems. The following chapters, dealing with toxicity testing, biochemical and physiological effects of pollutants, and biomarkers, give examples on the problems of testing the toxicity of mixtures and to address the currently topical issue of alternative testing methods; illustrate neurotoxicological effects, behavioural effects, and effects on plants; and discuss the principles of *in situ* biological monitoring. In the third part, chapters 12 and 13 emphasize the importance of simple measures of abundance, such as the decline of certain species of birds on farmland. Chapter 14 has been included to say more about the effects of chemicals upon communities and ecosystems, giving particular attention to recent work with mesocosms. Chapter 15 explains in detail the molecules-to-ecosystems approach, including examples of neurotoxicity and endocrine disruption, and prepares the ground for chapter 16, which discusses the employment of biomarker strategies in the studies.

The book is easy to read and will be of interest to undergraduate students and professionals in ecotoxicology and environmental toxicology.

**SOIL SAMPLING, PREPARATION, AND ANALYSIS** (2nd edition), by K.H. Tan, 680 pages, CRC Press, Taylor & Francis Group, Boca Raton, FL (2005), ISBN 0-849-33499-3, £49.99.

*Soil Sampling, Preparation, and Analysis* is divided into three sections: the first (chapters 1–4) covers principles of soil sampling, sources of errors, and variability of results; the second (chapters 5–13) explains common procedures for soil characterization (e.g. soil moisture, soil texture, density and porosity), extraction and analysis of macro- and micro-elements in soil plant testing; and the last (chapters 14–20) covers instrumentation, from colorimetry to atomic absorption, atomic emission, and plasma emission spectrometry, X-ray diffraction, electron microscopy, thermal analysis (DTA) and NMR, highlighting the major differences between humic and fulvic acids.

This new edition of *Soil Sampling, Preparation, and Analysis* provides students with an exceptionally clear description of the sampling and analysis methods most commonly used in modern soil laboratories around the world. What sets it apart as the first choice of professors is the grounding it offers in fundamental principles, professional protocols, and specific procedures.

TRACE ELEMENTS IN THE ENVIRONMENT: BIOGEOCHEMISTRY, BIOTECHNOLOGY, AND BIOREMEDIATION, edited by M.N.V. Prasad, K.S. Sajwan and R. Naidu, 744 pages, CRC Press, Taylor & Francis, Boca Raton, FL (2005), ISBN 1-566-70685-8, £92.00.

The book is a collection of contributions grouped under the sections of bioavailability, biogeochemistry, biotechnology, bioremediation, and risk assessment. Discussing trace elements in the holistic environment, the book covers advances in state-of-the-art analytical techniques, molecular biotechnology, and contemporary biotechnology that enhance knowledge of the behaviour of trace elements in the biogeosphere and at the cellular and molecular levels.

Bioavailability of trace elements in relation to root modification in the rhizosphere; and availability through sewage sludge and coal fly ash applications are some of the important issues discussed in the first section. Plant metallothionein genes; genetic engineering for the cleanup of toxic trace elements; 'metallomics'; phytotechnologies using trees; stabilization, remediation, and integrated management of metal contaminated ecosystems by grasses; applications of weeds more adapted to unfavourable soil conditions; detoxification and defence mechanisms in metal-exposed plants; biogeochemical cycling of trace elements by aquatic and wetland plants and its relevance to phytoremediation; plants that hyperaccumulate PTE and biodiversity prospecting for phytoremediation; phytomanagement of radioactively contaminated sites; adaptive physiology; and rhizosphere biotechnology are covered in the sections on biotechnology and bioremediation.

The risk assessment, pathways, and trace-element toxicity of sewage sludge-amended soils and usage in agroforestry; trophic transfer of trace metals and associated human health issues; and PTE accumulation, movement, and remediation in soils receiving animal manure are covered in the closing section.

Soil scientists, agricultural chemists, environmental researchers, ecologists, crop scientists and students in these areas will stimulate new ideas and further work in the field.

TRACE ENVIRONMENTAL QUANTITATIVE ANALYSIS: PRINCIPLES, TECHNIQUES AND APPLICATIONS (2nd edition), by P.R. Loconto, 731 pages, CRC Press, Taylor & Francis, Boca Raton, FL (2005), ISBN 0-824-75853-6, £79.99.

This book reviews the principles and practice of selected analytical instrumentation involved in trace environmental quantitative analysis (TEQA). The book begins with an overview of regulatory and EPA methods, followed by quantitative data reduction and interpretation of analytical results, sample preparation, and analytical instrumentation. Among the more than two-dozen new topics are the underlying principles of GC-MS, GC-MS-MS, LC-MS, and ICP-MS, column-chromatographic cleanup, gel-permeation chromatography, applications to biological sample matrices, and matrix solid-phase dispersion. The chapter on sample preparation includes more alternatives to liquid-liquid extraction, highlighting solid-phase microextraction (SPME), and stir-bar sorptive extraction (SBSE). Column-chromatographic cleanup and gel-permeation chromatography have been introduced along with additional applications to biological

sample matrices of environmental health and toxicological interest. Matrix solid-phase dispersion as applied to the isolation and recovery of persistent organic pollutants from fish tissue is also discussed. The final chapter contains laboratory-tested experiments to practice the techniques appearing in the text. Appendices include a convenient glossary, applications to drinking water, computer programs for TEQA, instrument designs, and useful Internet links for practising environmental analytical chemists. Beneath each chapter title is a brief 'chapter at a glance' so that the reader can find topics of immediate interest more quickly.

Students and teachers of analytical chemistry, and other disciplines requiring an analytical approach (e.g. toxicology, biochemistry, food science, environmental science, etc.) will find that the book might enhance their understanding of TEQA. Laboratory technicians of various skill and knowledge levels should also find the content of this edition beneficial.

**COASTAL FLUXES IN THE ANTHROPOCENE**, edited by C.J. Crossland, H.H. Kremer, H.J. Lindeboom, J.I. Marshall Crossland and M.D.A. Le Tissier, 232 pages, Springer, Heidelberg, Germany (2005), ISBN 3-540-25450-1, €79.95.

This book synthesizes knowledge on coastal and riverine material fluxes, biogeochemical processes and indications of change, and the human influence, before looking at future research and management needs. It compiles the work performed during the first decade (ending 2002) within the LOICZ (Land–Ocean Interactions in the Coastal Zone) Project.

Chapter 1 provides a description and operational definition of the coastal zone. Changes in the intensity and extent of human drivers and pressures for change are outlined, along with a consideration of economic valuation of coastal resources and services. The challenges in assessing change at global scales and the approaches taken by LOICZ are presented, especially the new tool of typology. Chapter 2 addresses the dynamics of a changing coastal boundary. Projections in sea-level fluctuation are reviewed along with the implications for changed coastal and shoreline vulnerability. The magnitude of the changes in sediment and water fluxes to the coastal sea and their ramifications on coastal and estuarine morphologies are highlighted. Submarine groundwater discharge is also discussed, including new methods for assessment. Chapter 3 examines the biogeochemical fluxes of nutrients, especially carbon, nitrogen, and phosphorus transport and transformations, within the coastal zone. The question of whether the coastal zone is a source or a sink for carbon is examined. New estimates of inorganic nutrient discharge from river catchments are derived that show significant changes in loads to the coastal seas within the last 30 years. Chapter 4 develops a broad picture of river catchment drivers and pressures and their impacts on coastal change. Where available, information on related governance response is provided. By looking at the river catchment–coastal sea continuum as a single system, the authors address individual catchment assessments and extrapolate information to regional or continental scales. Chapter 5 provides a synthesis of major scientific findings determined in the first four chapters and addresses the ramifications of the findings for policy- and decision-makers involved in governance and management of the coastal zone. The Appendix includes a list of key LOICZ publications and abbreviations to assist the reader.

The book will certainly be of reference for all those, in the academia, industry or public sector, involved in the study and management of the coastal environment.

THE OCEANS AND MARINE GEOCHEMISTRY, TREATISE ON GEOCHEMISTRY, Volume 6, edited by H. Elderfield, 664 pages, Elsevier, Amsterdam (2006), ISBN 0-08-045101-2, €80.00, £60.00.

This is volume 6 of the Treatise on Geochemistry edited by H.D. Holland and K.K. Turekian, a masterwork indispensable for all those involved in the different aspects of the field (see IJEAC, 85, 1205, 2005). *The Oceans and Marine Geochemistry* covers all the important topics needed for understanding the importance of the oceans on how the Earth works as an integrated system as well as how physical, biological, and chemical processes combine to influence issues as diverse as climate change and the capacity of the oceans to remove toxic metals.

The first section (chapters 1–6) discusses the contemporary ocean composition, dealing with physicochemical controls on sea water, controls on trace metals in seawater, gases in seawater, the biological pump, marine bio-inorganic chemistry, and marine organic geochemistry. The second section (chapters 7–11) deals with transport processes in the ocean: hydrothermal processes, tracers of ocean mixing, chemical tracers of particle transport, biological fluxes in the ocean and atmospheric  $p_{\text{CO}_2}$  and benthic fluxes and early diagenesis. The third section (chapters 12–17) moves to ocean history and covers the area of paleoclimatology and paleoceanography from marine deposits. The fourth and final section (chapters 18–21) discusses the evolution of seawater composition: the biological pump in the past, the ocean calcium carbonate cycle, Cenozoic ocean chemistry, and the early history of seawater.

The book, like the others within the Treatise, is an indispensable reference for academics and students in oceanography, specifically marine geochemistry. Scientists will also find in their pages a large amount of relevant information for their purposes.

J. Albaiges  
*CID-CSIC, Barcelona, Spain*