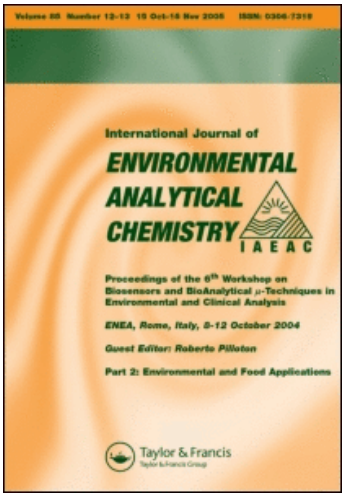


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# Book Reviews

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# BOOK REVIEWS

**Biofuels**, edited by Wim Soetaert and Erick J. Vandamme, Chichester, UK, John Wiley & Sons, Ltd, 2009, 256 pp., €82.90, ISBN 978-0-470-02674-8

This volume fits within the very timely Wiley series *Renewable Resources*. Renewable resources are a crucial area in the search for alternatives for fossil-based raw materials and energy. In the field of energy supply, biomass and renewable based resources will be part of the solution alongside other alternatives. This challenge can only be dealt with if scientists are attracted to this area and are recognised for their efforts in this interdisciplinary field.

*Biofuels* covers in depth the use and conversion technologies of biomass as a renewable resource to produce bio-energy, mainly in the form of liquid and gaseous biofuels. Topics treated by renowned experts in their field are the following: the sustainable production of cellulosic feedstock for biorefineries; process technologies for bio-ethanol production in the USA and Brazil; process technologies for biodiesel production; bio-based Fischer-Tropsch diesel production technologies; production and application plant oil biofuels; enzymatic production of biodiesel and production of biodiesel from waste lipids; biomass digestion to methane in agriculture: a successful pathway for the energy production and waste treatment worldwide; biological hydrogen production by anaerobic microorganisms; improving sustainability of the corn-ethanol industry.

The sustainability of biofuels production and use is particularly considered. Market developments in the sector, including trends on prices, markets and growth are also discussed. The links between the technical, economical and ecological aspects are clearly indicated throughout the text and are probably covered here for the first time in a single comprehensive volume.

Biofuels may find applications in the energy sector, chemistry, pharmacy, the textile industry, paints and coatings, to name but a few. Therefore, this comprehensive text will prove useful for chemists, biologists and engineers working in the concerned industries, as well as for researchers and academics interested in the field. The book is also relevant to people active in policy or financing, either within the government, industry or academia. This volume offers an excellent source of useful information and allows reflection about the bio-based economy in general.



**Ion Chromatography**, 4th ed., by James S. Fritz and Douglas T. Gjerde, Weinheim, Germany, Wiley-VCH Verlag GmbH & Co. KGaA, 2009, 377 pp., £100.00, ISBN 978-3-527-32052-3

This completely revised and updated fourth edition of this best-selling classic is a thorough treatment of the subject, making this a ready reference for analytical, environmental and food chemists, chromatographers, pharmaceutists, and chemists working in trace analysis. As in the previous editions, the materials, principles and methods of ion chromatography are described in a clear concise style and, following the latest developments, new chapters have been added.

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In the first chapter the historical milestones and the most basic principles of ion chromatography (IC) are briefly covered. The various components and hardware of IC instruments are described in Chapter 2, but as commercial products are constantly changing, the equipment is described in a somewhat general manner. Chapter 3 has been updated to include advances in column technology and promising new columns, such as monolithic columns. Chapter 4 on detectors includes new material on the contactless conductivity detector (CCD) and pulsed electrochemical detectors and an extensive table of dyes for tagging for the fluorescent detection of bio ions. Chapter 5 on the principles of IC separations has been completely rewritten and now includes detailed sections on the factors that influence selectivity and efficiency. The basics of anion and cation chromatography are presented in the next two chapters. Selection of appropriate columns, detectors and eluents is discussed and numerous examples of typical separations are given. Ion exclusion chromatography is introduced in Chapter 8, covering the separation of hydrophilic sample components, such as carboxylic acids, amines and carbohydrates.

Although IC is the preferred method for inorganic ions and smaller organic ions, the need for chromatographic determination of larger organic and bio ions has been growing rapidly, as for example in the pharmaceutical industry. Here, Ion Pair Chromatography (IPC) is often the preferred technique. A new chapter (Chapter 9) on IPC is now included.



Chapter 10 on Zwitterion Stationary Phases, which contain both positive and negative sites, describes a fascinating variation of IC where ions elute as cation-anion pairs. Capillary electrophoresis is covered in Chapter 11. Then, in Chapter 12, the reader is introduced to the fascinating world of the chromatography of large bio ions (e.g. DNA molecules). Structural features, common terms and chromatographic techniques are explained in a manner that the non-expert can easily understand. Chapter 12 on Separation of DNA/RNA highlights a trend in IC toward a greater emphasis on analytical separations of bio ions. Sample pretreatment is discussed in the new Chapter 13. Chapter 14 on Method development and validation includes tips for selecting appropriate conditions for an IC analysis, and this final chapter covers chemical speciation.

**The MAK-Collection for Occupational Health and Safety Part III: Air Monitoring Methods**, Vol. 11, edited by Harun Parlar, Weinheim, Germany, Wiley-VCH Verlag GmbH & Co. KGaA, 2009, 196 pp., £90.00, ISBN 978-3-527-31959-6

The present volume belongs to the collection of analytical methods developed and published since the early 1970s by the Working Subgroup 'Analyses of Hazardous Substances in Air of Work Areas' of the Working Group 'Analytical Chemistry' of the Commission for the Investigation of Health Hazards of Chemical Compounds of the Deutsche Forschungsgemeinschaft (DFG). For the moment, methods enabling the monitoring of about 225 hazardous substances in the air of workplaces have been collected. All methods are validated and have been checked for their analytical reliability and reproducibility. Thus, these analytical procedures can be directly adopted and used for laboratories as laboratory regulations in the sense of so-called Standard Operating Procedures (SOP).

In this volume, the collection of methods has been supplemented by six further analytical procedures for the determination of 15 hazardous substances in the air

of work areas, including acrylamide, carbon disulfide, diisocyanates (2,4-toluene-, 2,6-toluene-, 4,4′-methylene diphenyl-, isophorone-, 1,5-naphthylene-, 1,6-hexamethylene-diisocyanate), alveolar fibres (including asbestos) and phthalates (butylbenzyl-, diallyl-, dibenzyl-, di-n-butyl-, dicyclohexyl-, diethyl-, di-(2-ethylhexyl) phthalate). The volume also comprises two general chapters devoted to the Evaluation of methods for air analysis without experimental examination and Sampling and analysis of gases and vapours.

Each method description includes a short evaluation of the procedure, sampling guidelines, general information on the chemical compound to be analysed, a brief list of the reliability criteria, the advantages and disadvantages of the procedure and information on the equipment needed. This is followed by a detailed description of the sampling and analytical steps, a discussion of the reliability of the method and a reference list.

All volumes of the MAK-Collection provide comprehensive and authoritative information for occupational health and safety professionals and researchers. The complete collection is available at www.mak-collection.com and has been referenced previously in this section of Book Reviews in *IJEAC*. The publication may be considered as a contribution to the worldwide demand for well-established methods for the analysis of chemicals in air of work areas for the prevention of health impairment.



**Understanding Bioanalytical Chemistry Principles and Applications**, edited by Victor A. Gault and Neville H. McClenaghan, Oxford, UK, Wiley-Blackwell, 2009, 290 pp., £27.50, ISBN 978-0-470-02907-7

Conventional textbooks tend to present chemistry in a way that is not always easily accessible to students, particularly those coming from diverse educational backgrounds, who may not have formally studied chemistry before. This particular textbook undertakes a new, fresh and innovative approach to teaching and learning of chemistry, focusing on bioanalysis to set knowledge in context. Using relevant real-life examples, the authors have covered basic principles, terminology and core technologies, which include key modern experimental techniques and equipment used to analyse important biomolecules in diagnostic, industrial and research settings.

The book encompasses 12 chapters, including an Introduction to biomolecules, Analysis and quantification of biomolecules, Transition metals in health and disease, Ions, electrodes and biosensors, Applications of spectroscopy, Centrifugation and separation, Chromatography of biomolecules, Principles and applications of electrophoresis, Applications of mass spectrometry, Immunochemical techniques and biological tracers, Bioanalysis by magnetic resonance technologies: NMR and MRI, and Bioanalytical approaches from diagnostic, research and pharmaceutical perspectives. Each chapter starts with a list of learning objectives and concludes with a number of key points summarising the content. In order to develop students' knowledge and understanding of core concepts, chapters also include worked examples.

The book concludes with a chapter containing a range of questions for self-assessment and four appendixes including International system of units (SI) and common prefixes, The periodic table of the elements, Common solvents and biological buffers and the Answers to the self-assessment questions.

Clearly written and user-friendly, with numerous full colour illustrations, annotated images, diagrams and tables, this book incorporates a modem approach to teaching and learning to motivate the reader and encourage student-centred learning.

This textbook, primarily targeted to undergraduate life and health science students, represents an invaluable tool for students and instructors across the diverse range of biological and health science courses.

**Analytical Measurements in Aquatic Environments**, edited by Jacek Namiesnik and Piotr Szefer, Boca Raton, FL, USA, CRC Press, Taylor & Francis Group, 2009, 592 pp., £82.00, ISBN 978-1-4200-8268-5

This book discusses all aspects of analytical protocols for fresh and marine waters, from the handling of representative samples to the metrological evaluation of specific steps and whole procedures.

The book consists of a set of chapters focused on the most important aspects of analytical procedures for the determination of both inorganic and organic constituents in samples taken from different parts of aquatic ecosystems. In the first chapters it covers different aspects of sample collection and sample handling, sample preservation techniques, and extraction techniques, including solvent-free sample preparation for analysis. The following chapters are devoted to speciation analytics, immunochemical analytical methods, application of biotests, bioanalytical methods for monitoring, green analytical chemistry – application of the concept of sustainability in analytical laboratories, and analytical techniques for the determination of organic and inorganic constituents. The last two sections of the book are devoted to chemometrics for data processing and quality control and quality assurance of analytical results, and to application of the life cycle assessment approach for analytical protocols.

Drawing on the disciplines of chemistry, physics, computer science, electronics, material science and chemometrics, this book provides extensive and in-depth information on the most important problems in analysis of aquatic samples. With an accurate presentation of the different topics, elaborated by known experts in each one of them, and an extensive literature at the end of each chapter, it will be a useful source of information for a wide spectrum of readers from graduate students to practitioners in private and public laboratories.



**Ecotoxicology of Explosives**, edited by Geoffrey I. Suncahara, Guilherme Lotufo, Roman G. Kuperman and Jalal Hawari, Boca Raton, FL, USA, CRC Press, Taylor & Francis Group, 2009, 336 pp., £78.99, ISBN 978-0-8493-2839-8

The book is the result of the project 'Development of Environmental Threshold Values for Defence Sites Contaminated with Energetic Materials' conducted to promote the data acquisition and sharing of ecotoxicological information to address environmental problems related to energetic materials (EMs). The first objective of this international initiative involved the development of environmental threshold concentrations for explosives and propellants. These criteria were needed for the ecological risk assessment (ERA) of sites contaminated with EMs. The second objective of this project was to review the accessible fate and ecotoxicological data for EMs and the methodologies for their development, and to make them available to interested parties through the publication of a book on the ecotoxicology of explosives.

The book presented here is structured to first characterise the fate and transport of explosives in the environment; this knowledge will help the reader to understand the

potential hazardous impact and bioaccumulation of EMs in different terrestrial and aquatic ecological receptors. Then, it provides information on their ecological effects in key environmental media, including aquatic, sediment and terrestrial habitats. Finally it describes the practical application of fate and ecotoxicological information to the environmental risk assessment of EM-contaminated sites. The genotoxic effects of EMs as well as the current understanding of the cellular and molecular mechanisms underlying the toxicity of these chemicals are reviewed.

The information presented follows the recognition that the ecotoxicological characterisation of an EM-contaminated site can be accomplished through establishing a relationship between the measures of exposure to the EMs determined by chemical analyses and the measures of the effect of the EMs determined by toxicity testing. Approaches to assembling these lines of evidence for environmental risk assessment purposes may not be obvious to the non-specialist and are discussed in relevant chapters of the book.

This book is intended for readers at graduate and undergraduate university levels, as well as for a wide range of environmental professionals, including scientists, engineers, consultants, site managers, regulators and decision makers at EM-contaminated installations and ranges.



**Nanoscience and Nanotechnology. Environmental and Health Impacts**, edited by Vicki H. Grassian, Hoboken, NJ, USA, John Wiley & Sons, Ltd, 2008, 470 pp., £62.50, ISBN 978-0-470-08103-7

Manufacturing and use of nanomaterials have grown dramatically in the last decade and promises to grow in the future. Currently, nanomaterials are used in medical devices, pharmaceuticals, environmental remediation, and in scores of consumer products ranging from cosmetics to electronics. As more and more nanomaterials are developed and more and more applications are discovered, questions about how these materials affect the environmental and human health are becoming increasingly urgent. The aim of the research activities discussed in each of the chapters of this book is to provide strong scientifically based answers to these important questions and to provide a high level of scientific understanding for the development of sound environmental policies.

The book is divided into three parts. Part I consists of three chapters: 'Nanomaterials and the environment' discusses the different types of nanomaterials that are being commercially produced and the potential for these materials to get into the environment; 'Assessing the life cycle environmental implications of nanomanufacturing: Opportunities and challenges' discusses different approaches towards life cycle assessment that are being explored, as well as the difficulties; and the last chapter, 'An integrated approach toward understanding the environmental fate, transport, toxicity, and health hazards of nanomaterials', focuses on the importance and need to integrate high-quality nanomaterial characterisation with studies related to the environmental health and safety of these materials and shows examples of different techniques that can be used for nanomaterials' physicochemical characterisation.

Part II focuses on the fate and transport of nanomaterials in the environment. Six chapters cover this topic with an emphasis on water and soil environments. Three of the chapters focus on metal and metal oxide nanomaterials. These include 'Properties of commercial nanoparticles that affect their removal during water treatment';

'Transport and retention of nanomaterials in porous media'; and 'Transport of nanomaterials in unsaturated porous media'. Two chapters focus on carbon-based nanomaterials: 'Surface oxides on carbon nanotubes (CNTs): Effects on CNT stability and sorption properties in aquatic environments' and 'Chemical and photochemical reactivity of fullerenes in the aqueous phase'. The last chapter of this part, 'Bacterial interactions with CdSe quantum dots and environmental implications', looks at a different class of nanomaterials, crystalline semiconductor quantum dots, and their interactions with bacteria.

Part III contains eight chapters on the toxicity and health hazards of nanomaterials, from cells to humans. The first chapter in this part, 'Potential toxicity of fullerenes and molecular modelling of their transport across lipid membranes', focuses on toxicity of fullerenes and their transport across membranes. The next two chapters focus on *in vitro* studies and include '*In vitro* models for nanoparticle toxicology' and 'Biological activity of mineral fibres and carbon particulates: Implications for nanoparticle toxicity and the role of surface chemistry'. The next two chapters investigate environmental health and safety from an organism perspective: 'Growth and some enzymatic responses of *E. coli* to photocatalytic $TiO_2$' examines the response of *E. coli* in the presence of illuminated $TiO_2$ nanoparticles, and 'Bioavailability, trophic transfer and toxicity of manufactured metal and metal oxide nanoparticles in terrestrial environments' focuses on bioaccumulation and trophic transfer of metal and metal oxide nanoparticles. The last chapters of Part III focus on issues related to the toxicity of inhaled nanomaterials and the impact on human health, including occupational health hazards.

Reflecting the need for interdisciplinary research in this area, the book's contributing authors represent a broad range of disciplines, including chemistry, microbiology, engineering, medicine and occupational and environmental health. It will be of interest to both scientists and policy developers.



**Photochemistry of Organic Compounds. From Concepts to Practice**, by Petr Klán and Jakob Wirz, Chichester, UK, John Wiley & Sons, Ltd, 2009, 582 pp., £120.00, ISBN 978-1-4051-9088-6

Photochemistry is intrinsically an interdisciplinary field pertaining to all natural sciences and many technical disciplines. This text aims to provide a hands-on guide for scientists in all fields, inspiring and aiding them to pursue their own research dealing with desired or unwanted effects associated with light absorption, as well as for undergraduate and graduate students of chemistry.

Coverage of the relevant literature is extensive, with over 1500 references being provided. Both current research (up to mid 2008) and early pioneering contributions are cited and recommended reading draws attention to outstanding, more profound treatments of special topics.

The text is interlace with 32 *Special Topics* that provide information about some special applications of photochemistry in chemistry, physics, medicine, technology and in practical life, and about important photochemical processes that occur in the human body, green plants, the atmosphere and even deep space. Moreover, 39 *Case Studies* offer a glance at particular examples, often accompanied by detailed descriptions of laboratory procedures. Solved *Problems* at the end of the chapters and in some sections are intended as a practical aid to practice and refresh the readers' preceding studies.

The essentials of a quantum mechanical treatment of the interaction of electromagnetic radiation with molecules are summarised on a descriptive basis in the introductory Chapter 1, along with a few historical remarks. The basic concepts of photophysics and photochemistry and of energy transfer as well as a classification of photoreactions are presented in Chapter 2. Laboratory proceedings and equipment are described in Chapter 3, which includes quantum yield measurements, Stern-Volmer kinetics and the global analysis of spectral data. Chapter 4 provides simple but useful models describing electronic excitation and the associated profound changes of electronic structure, which are designed to help the reader to understand and undertake to predict photochemical reactivity. Chapter 5 describes exemplary cases of mechanistic investigations and time-resolved studies of important reactive intermediates such as carbenes, radicals and enols.

The extensive Chapter 6 is divided into eight sections dealing with the photochemistry of the most typical organic chromophores. The information is organised according to structural categories that are common in organic chemistry, such as alkanes, alkenes, aromatic compounds and oxygen atom-containing compounds, and emphasises a visual presentation of the material. A list of recommended review articles and selected theoretical and computational photochemistry references is also provided. The compiled information of each section is then categorised by the mechanisms of photoreactions in individual subsections. The mechanism is first discussed in general terms; a number of examples follow, in which detailed reaction schemes of the mechanism are presented and discussed. Basic information about these particular reactions, such as the multiplicity of the reactive excited species, key reaction intermediates and chemical yields, is often provided and extensively referenced to the primary and secondary literature. The last section focuses on the reactions of auxiliary chromophores such as photosensitisers, photocatalysts and photoinitiators. Chapter 7, on retrosynthetic photochemistry, is a graphical compilation of reaction schemes, listed according to the target structures, which can be synthesised by the photochemical reactions described in the previous chapter.



**Transformation Products of Synthetic Chemicals in the Environment**, edited by Alistair B.A. Boxall, Heidelberg, Germany: Springer-Verlag, 2009, 249 pp., €245.03, ISBN 978-3-540-88272-5

This book brings together contributions from leading experts in the field to provide an overview of the current knowledge on the formation, detection, occurrence, effects and treatability of transformation products in the environment. The book is divided into three parts. Part I deals with the *Formation, Detection and Occurrence of Transformation Products*. In the chapter 'Mechanisms of degradation of synthetic chemicals', the mechanisms by which transformation products are formed are discussed and how this information can be used to predict the structures of transformation products. In the chapter 'Predicting the persistence of organic compounds' a wider range of methods for predicting degradation rates and degradation pathways is presented. The chapter 'Analysing transformation products of synthetic chemicals' describes the challenges for analysing transformation products and discusses the application of some of the new analytical methods for identification and quantification of transformation products in environmental systems. In 'Occurrence of transformation products in the environment', the results of a series of monitoring studies into the occurrence of selected transformation in US water bodies is described.

Part II deals with the *Exposure of Transformation Products*. The chapter on 'Fate of transformation products of synthetic chemicals' shows experimental data on the persistence and mobility of transformation products in environmental systems and in 'Modeling environmental exposure to transformation products of organic chemicals', modelling approaches for assessing exposure levels for transformation products in a range of environmental systems are described. Finally, 'Treatment of transformation products' shows how transformation products can be removed in treatment processes and also how treatment processes can act as routes of transformation product formation.

Part III on *Effects of Transformation Products* includes the chapters 'Ecotoxicity of transformation products' and 'Predicting the ecotoxicological effects of transformation products'. It is clear from each of the chapters that while we are now well placed to better assess transformation product risk, there is still much that needs to be done.

Many of the chapters introduce methods for assessing the different components required to determine the risks of transformation products to natural systems and highlight areas where we need further development, such as: expert systems for predicting the nature of transformation products, e.g. in drinking water treatment processes, analytical methods, monitoring studies for transformation products, exposure models and predictive approaches for estimating the ecotoxicity of transformation products, etc.

It is hoped this book will be of interest to researchers, regulators and students from these different fields to contribute in developing approaches and knowledge for improving our understanding of the risks of transformation products and of how to control these risks.



**Biosensors for Environmental Monitoring of Aquatic Systems Bioanalytical and Chemical: Methods for Endocrine Disruptors,** edited by Damia Barceló and Peter-Diedrich Hansen, Heidelberg, Germany, Springer-Verlag, 2009, 278 pp., €229.00, ISBN 978-3-540-00278-9

*Biosensors for the Environmental Monitoring of Aquatic Systems* is based on the scientific developments and results achieved within a group of European Union (EU) funded projects during the last ten years carried out in parallel with the implementation of the EU Water Framework Directive that compelled the development of new or improved tools for monitoring of water quality. The contributions in this book intend to summarise some of the practical achievements in the field of biosensors for environmental monitoring in Europe focusing, mainly, on examples of chemical groups of analytes (or effects) in different water matrices and more specific aspects of biosensor technology. The target objective of this book is to provide an overview of biosensors as a practical alternative and complementary or additional measurement methodology to traditional chromatographic techniques. Emphasis is also given to the validation of the applied technology and its application to real-world environmental samples.

The various chapters cover examples in different areas as follows: Biosensors for environmental monitoring at global scale and the EU level, Immunosensors for the determination of pesticides, endocrine disrupting chemicals and pharmaceuticals, Biosensors for pharmaceuticals and emerging contaminants based on novel micro and nanotechnology approaches, Recombinant yeast assays and gene expression assays for

the analysis of endocrine disruption, and Biosensors for aquatic toxicology evaluation genetically engineered bacteria for genotoxicity assessment.

The challenge for environmental biosensors remains open and further research in this area will only prove that new parameters are needed for safer and more complete environmental risk assessment. It is expected that collaborative work, focused research, and interdisciplinary approaches may lead to biosensor indexes that will certainly contribute to a better knowledge and real-time characterisation of environmental samples, demonstrating not only cost-effective alternatives for screening but also effect related readouts where new and unpredictable approaches are expected.

The book will be of interest to a broad audience of analytical chemists, biologists, environmental chemists, water management operators, and technologists working in the field of wastewater treatment, or newcomers who want to learn more about the topic using new measurement devices such as biosensors.

**Antarctic Climate Evolution**, edited by Fabio Florindo and Martin Siegert, Amsterdam, NL, Elsevier, 2009, 606 pp., €113.95. ISBN 978-0-444-52847-6



*Antarctic Climate Evolution* is the first book dedicated to understanding the history of the world's largest ice sheet and, in particular, how it responded to and influenced climate change during the Cenozoic. To explain the story of Antarctic ice and climate history, information on terrestrial and marine geology, sedimentology, glacier geophysics, ship-borne geophysics, obtained with the most innovative techniques, and numerical ice sheet and climate modelling is presented within thirteen chapters. This new cross-disciplinary approach has led to a substantial improvement in the knowledge base on past Antarctic climate and to our understanding of the factors that have guided its evolution. This in turn has allowed building hypotheses, examinable through numerical modelling, for how the Antarctic climate is likely to respond to present and future global changes.

The book's content largely mirrors the structure of the Antarctic Climate Evolution (ACE) program (www.ace.scar.org), an international initiative of the Scientific Committee on Antarctic Research (SCAR), affiliated with the International Polar Year 2007–2009, to investigate past changes in Antarctica by linking climate and ice sheet modelling studies with terrestrial and marine geological and geophysical evidence of past changes. Most of the subcommittees in ACE have been responsible for individual chapters dealing on the climate conditions and change in both the recent past (i.e. during the last glacial maximum, when temperatures were cooler than at present) and the more distant past (i.e. in the pre-Quaternary, when global temperature was several degrees higher than it is today). The book concludes with a chapter on remarks on recent changes in Antarctica and future research needs. In this way the book covers the complete history of the Antarctic ice sheet and its climate evolution.

The book is relevant to research scientists from a wide range of disciplines including glaciology, palaeoclimatology, sedimentology, climate change, environmental science, oceanography and palaeoentology. It will also be valuable as a supplementary text for students of Earth history.

**Climate Change: Observed Impacts on Planet Earth**, edited by Trevor M. Letcher, Amsterdam, NL, Elsevier, 2009, 593 pp., €63.95, ISBN 978-0-444-53301-2

The climate of the earth is always changing; in the past, as a result of natural causes, but at present greatly influenced by anthropogenic emissions of greenhouse gases. Despite the many signs of global warming, there are still many people who will not accept that something very ominous is taking place. This book is a very positive contribution to the problem. The editor is to be congratulated for inspiring so many world class experts into compiling such an exceptional volume aimed at assessing and accounting for our changing climate. The book does not focus on models to predict climate change in the future but on experimental observations to provide answers to the basic questions: what can possibly cause global warming and climate change; and what evidence do we have that such changes are taking place?

The book is divided into 25 chapters, each one written by an expert in the field. Each chapter begins with an Introduction and finishes with a Conclusion, is written in lay-person's language and each chapter contains references to all the relevant and latest scientific publications. Part I is devoted to *Possible Causes of Climate Change*, with chapters on The role of atmospheric gases in global warming, The role of widespread surface solar radiation trends in climate change: dimming and brightening, The role of space weather and cosmic ray effects in climate change, The role of volcanic activity in climate and global change, and The role of variations of the earth's orbital in climate change. To put the whole idea of climate change in perspective, Part II provides an overview on the *Geological History of Climate Change*. Finally, Part III provides an extensive review of *Indicators of Climate and Global Change*, including scientific observations expert interpretations of the changes taking place in diverse areas such as in atmospheric circulation, weather patterns, bird and mammal and insect ecology, plant ecology and plant pathogens, lichens, crop production, pelagic and planktonic ecosystems, coral reef ecosystems, changes in marine biodiversity, sea level rise, ocean temperature and current changes, ocean acidification, glacial and polar cap melting, and coastline degradation.

The evidence from the book that global warming and all the resultant changes is due to human activity makes one appreciate just how fragile our environment is and the challenging problems we need to solve. In this way the book will be of great benefit to students and researchers in each of the topics as well as making an excellent source and textbook for academic courses in 'Climate Change'. But the book is written not only for students and researchers and their professors, but for decision makers in government and industry, journalists and editors, corporate leaders and all interested people who wish for a balanced, scientific and honest look at this major problem facing us in the 2lst century.

**Atmospheric and Biological Environmental Monitoring**, edited by Young J. Kim, Ulrich Platt, Man Bock Gu and Hitoshi Iwahashi, Dordrecht, Germany, Springer, 2009, 311 pp., €139.05, ISBN 978-1-4020-9673-0

The study of environmental pollution impacts, from the mechanism of toxic nanoparticles at molecular level to the detection of trace gases on the satellite perspective, requires developing advanced monitoring techniques, efficient process technologies and health impact assessment tools to fill the gaps in our scientific knowledge. This edition of

*Atmospheric and Biological Environmental Monitoring*, available online (www.springer.com/earth+sciences), is a handful of recent developments and techniques from environmental scientists in well-diversified fields. These manuscripts were collected from the presentations at the '7th International Symposium on Advanced Environmental Monitoring' organised in Honolulu, Hawaii (25–28 February 2008) by the Advanced Environmental Monitoring and Research Center, Korea.

The three parts of the book highlight important aspects of emerging environmental monitoring technologies: Atmospheric Environment, Contaminants Control Process, and Environmental Toxicity Assessment. Observational tools presented in the first part ranges from *in-situ* aerosol sampling and measurements (e.g. digital photographic techniques, imaging differential optical absorption spectroscopy (DOAS), FT/IR, etc.) to satellite remote sensing for atmospheric monitoring (e.g. by scanning imaging techniques). Smog chamber measurements are also presented. Highlighted in the second part are the recently developed vertically moving automatic water monitoring system for lake water quality management and membrane technologies for detection and removal of contaminants. Finally, toxicity monitoring of endocrine disruptors and nanoparticles are highlighted in the third part with new discoveries, including the use of genomic and metabolomic technologies and electrochemical biosensors and biochips for environmental monitoring.

The book may have its audience among scientists, scholars, professionals and policy makers involved in environmental quality assessment.



**Environmental Toxicants: Human Exposures and Their Health Effects,** 3rd ed., edited by Morton Lippmann, Chichester, UK, John Wiley & Sons, Ltd, 2009, 1167 pp., £130.00, ISBN 978-0-471-79335-9

The third edition has thoroughly updated and revised the previous ones, published in 1992 and 2000, with the latest findings on the effects of human exposure in non-occupational settings to chemical agents and physical factors. In particular, the book reports on significant new developments on the effects of exposure to drinking water disinfection by-products, food additives, volatile organic compounds and sick building syndrome, formaldehyde and other aldehydes, ambient air particulate matter, arsenic, asbestos and orthr mineral and vitreous fibers, benzene, carbon monoxide, chromium, diesel exhaust, dioxons and dioxin-like compounds, endocrine disruptors, noise, radon and lung cancer and ultraviolet radiation.

In addition to examining individual toxicants, the book explores in the first chapters broader social and scientific issues such as individual and community risks, risk reduction from environmental engineering and clinical perspectives, and lessons learned from the industrial sector for the translation of knowledge into corporate policies, programmes and practices for health protection.

While notable progress has been made in environmental health sciences in recent years, significant challenges remain, which are clearly presented and discussed in the book, such as the understanding of the biological mechanisms responsible for the adverse effects produced by environmental exposures; the factors that account for the generally large inter-individual variability in responses to exposure; and exposure-response relationships for sensitive population segments. In this respect, another challenge is that the populations of both the general public and the environmental health research community are aging. Older people are clearly a susceptible population to many environmental toxicants,

and the research needed to identify means of recognising, evaluating and controlling exposures to these toxicants.

The chapters have been contributed by lead environmental health scientists whose expertise spans all the environmental toxicants and issues examined in the book. This third edition is an essential guide for public health officials, industrial hygienists, epidemiologists and physicians involved in risk assessment and health management for exposed individuals and populations.

**Arsenic: Environmental Chemistry, Health Threats and Waste Treatment**, edited by Kevin Henke, Chichester, UK, John Wiley & Sons, Ltd, 2009, 588 pp., £120.00, ISBN 978-0-470-02758-5

Arsenic contamination in drinking water aquifers is one of the worst and most widespread environmental problems currently facing humanity. More than 100 million people may be at risk from utilising arsenic-contaminated groundwater. Here are the well known cases of affected people in Bangladesh and West Bengal, India, as well as in parts of Argentina, Cambodia, Chile, mainland China, Mexico, Nepal, Pakistan, Taiwan, Vietnam, and the United States. *Arsenic: Environmental Chemistry, Health Threats and Waste Treatment* can be viewed, to some extent, as an update to the many excellent books and summary articles that have been published up to now on a wide variety of arsenic related topics. More importantly, however, this book will serve as a broad and single resource on the subject.



In its chapters and sections, the book discusses the major historical, geological, chemical, remediation and environmental subjects related to arsenic, presenting information on relatively common arsenic minerals and their key properties. In addition, it includes discussions on the environmental impacts of the release of arsenic from mining and coal combustion. Chapter 1 provides an introduction to the discussions in the other chapters. In Chapter 2, details on the chemistry and important physical properties of arsenic and its most common naturally occurring compounds (minerals) are reviewed. Background information is also provided on thermodynamics and adsorption isotherms. Chapter 3 reviews the nucleosynthesis of arsenic in massive stars, its distribution in the solar system, important oxidation and reduction reactions, and the distribution and behaviour of arsenic in the Earth's natural environments. The toxicology and epidemiology of arsenic are discussed in Chapter 4, which includes summaries of animal tests and the health effects of arsenic inhalation, digestion, and dermal exposure on humans. Chapter 5 discusses the history and commercial use of arsenic in human societies. Examples are also given of criminal and accidental arsenic poisoning events in the nineteenth and twentieth centuries. Chapter 6 concentrates on the catastrophes of arsenic contamination in groundwaters, and discusses examples in several places of Bangladesh, India, Nepal, Pakistan, Myanmar, Cambodia, Vietnam, and Laos, Inner Mongolia of China, Taiwan, Ghana, Nigeria, Australia, the United States, Chile, and Argentina. Finally, Chapter 7 reviews remediation and treatment technologies for arsenic in water, solids and flue gases. Although not every arsenic related topic can be extensively discussed, the authors have tried to provide a number of key references that contain additional details for the readers.

The book concludes with several appendices, which include convenient lists of measurement conversions (Appendix A), a glossary of important terms (Appendix B), tables

of thermodynamic data on arsenic and its major compounds and chemical species (Appendix C), maps showing the locations of major sites with arsenic contamination (Appendix D), and a survey of prominent International, North American and European guidelines and regulations on arsenic (Appendix E).

Although the book is primarily written for chemistry, toxicology and geology students, the discussions and information would also be useful to scientists and engineers from many different disciplines, medical experts, environmentalists, regulators and waste management personnel.

**The Triazine Herbicides: 50 Years Revolutionizing Agriculture**, edited by Homer M. LeBaron, Janis E. McFarland and Orvin C. Burnside, Amsterdam, NL, Elsevier, 2008, 600 pp., €106.95, ISBN 978-0-444-51167-6

This is the most comprehensive and up-to-date treaty on the science and agriculture of one of the modern herbicide family, the triazines. The book contains a great deal of solid information about these herbicides that have, over the past 50 years, made a great impact on agriculture and world hunger by assisting in the development of new farming methods, providing greater farming and land use capabilities, and increasing crop yields.



The first three chapters offer a historical perspective of the discovery and development of triazine herbicides that represented a milestone in the development of weed control, and detail the production technology, development and registration of these herbicides. The next three chapters report on the weed control trends and practices in North America and farming trends and practices in Northern Europe, and the impact of triazines on the biology and ecology of weed. The plant uptake and metabolism and the mode of action in plants is covered in Chapters 7 and 8, whereas Chapters 9 to 11 describe the basis of crop selectivity and weed resistance to triazine herbicides, distribution and management of triazine-resistant weeds, and weeds resistant to nontriazine classes of herbicides. Eight chapters (12–19) are devoted to demonstrate the benefits of the use of triazines in weed control in a large variety of crops, including corn and sorghum production, ecofallow, sugarcane, citrus management, fruit and nut crops, the production of ornamentals and conifer trees and turf. The next five chapters (20–24) review the methods of analysis for triazine herbicides and their metabolites, the triazine soil interactions, biotic (microbial) and abiotic (photolysis and hydrolysis) degradation processes, and movement and persistence in soil. The hazard assessment is extensively discussed in Chapters 25 to 31, describing the mode of action of atrazine for mammary tumour formation in the female Sprague-Dawley rats, dietary exposure assessment of the triazine herbicides, probabilistic assessment of laboratory-derived acute toxicity data to aquatic organisms, and probabilistic risk assessment using atrazine and simazine as a model. This section also includes two reviewes of the monitoring data obtained during the large survey of atrazine and simazine in community water systems in the United States during 1993 to 2000, and a decade of measuring, monitoring, and studying the fate and transport of triazine herbicides and their degradation products in groundwater, surface water, reservoirs, and precipitation by the US Geological Survey. The last chapters of the book deal with the progress in best management practices, environmental benefits of triazine use in conservation tillage, the role of triazine herbicides in sustainable agriculture: potential

of non-chemical weed control methods as substitutes for herbicides in United States corn production, and environmental stewardship: the roots of a family farm.

In summary, *The Triazine Herbicides* is a reference book for researchers in weed management, for agriculturalists, botanists and horticulturalists. With emphasis on how the chemicals are studied and developed, reviewed and used at the agricultural level, this book provides valuable insight into the benefits of triazine herbicides for sustainable agriculture.

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