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BOOK REVIEWS

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BOOK REVIEWS

AEROSOL SAMPLING. SCIENCE, STANDARDS, INSTRUMENTATION AND APPLICATIONS, by James H. Vincent, 616 pages, Wiley, Chichester, UK (2007). ISBN 978-0-470-02725-7. £85.00.

The field of aerosol sampling has moved forward dramatically during the past two decades. The book properly appeared at a time of growing interest in aerosol sampling through the widening of the scope of health-related particle size-selective aerosol measurement, in particular the emergence of new criteria and standards, along with new instrumentation.

The book provides a comprehensive account of the important field of aerosol sampling as it is applied to the measurement of aerosols that are ubiquitous in occupational and living environments, both indoor and outdoor. Both scientific and practical aspects are extensively covered. It is written in four parts: Part A (eight chapters) describes the current knowledge of the physical science that underpins the process of aerosol sampling under different atmospheric conditions. Part B (four chapters) presents the basis of standards for aerosol sampling in working, living and ambient environments and particle size-selective criteria for coarse and fine aerosol fractions, including the link with human exposure by inhalation.

Part C (eight chapters) covers the development of practical instrumentation for sampling of aerosols in workplaces, in stacks and dusts in the ambient atmosphere, and the new areas of bioaerosols and direct-reading instrumentation. Particular attention is given to how technical designs and methods have evolved over the years in order that aerosol sampling may be carried out in a manner matching the health-related and other criteria that have been proposed as parts of standards. Finally, Part D (three chapters) describes how a wide range of aerosol sampling instruments have performed when they have been applied in the field in both occupational and ambient atmospheric environments, including how different instruments, nominally intended to measure the same aerosol fraction, compare when used side by side in the real world.

This excellent book is intended to draw together all that is known about aerosol sampling – about the science and across a very wide range of applications – for the benefit of researchers and practitioners in occupational and environmental health and hygiene, aerosol scientists, and engineers, as well as graduate-level students in these fields. In addition, the text will be of interest to environmental and occupational epidemiologists, atmospheric scientists, and occupational and environmental health policy specialists, including all those around the world engaged in the processes of setting standards for airborne particulate contaminants.

ATMOSPHERIC DEGRADATION OF ORGANIC SUBSTANCES. DATA FOR PERSISTENCE AND LONG-RANGE TRANSPORT POTENTIAL. by Walter Klöpffer and Burkhard O. Wagner, 241 pages, Wiley-VCH Verlag GmbH & Co., Weinheim, Germany (2007). ISBN 978-3-527-31606-9. €139.25.

The photochemically induced degradation of organic pollutants is an important indicator for their persistence and long-range transport potential and a critical factor for assessing the environmental hazards caused. This book is an important introduction to the regulatory and scientific aspects of photo-degradation of chemicals in the environment.

The book consists of three parts: Chapter 1 describes the political and regulatory implications of abiotic degradation in recent years. The science behind the photochemical degradation of semi-volatile organic compounds in the atmosphere is presented in Chapter 2. Chapter 3 contains data on degradation rates for 1081 substances in the form of a Table, with ca. 300 footnotes and 553 references updated to the summer of 2006. Besides the substances produced by the chemical industry, there are also some research products, e.g. potential freon substitution products. It also contains a number of transformation products of photochemical degradation processes, studied in order to elucidate processes following the primary attack by radicals, ozone, or photons. The presentation of the data in Chapter 3 aims at the rapid finding of one preferred rate constant or quantum efficiency for each substance and reaction. However, the book does not simply list and explain various rate constants but discusses the importance of these data generated by environmental scientists for environmental policy and regulation.

The main target group consists in environmental experts and administrators in industry and government looking for existing data. They also have access to a survey of the research field from the regulator's perspective and from the researcher's perspective. For researchers at universities and specialized laboratories, who have access to most of the original and reviewed literature, this book may help in the rapid access to data and references. It is therefore complementary to the great books and reviews (e.g. the monographs of Roger Atkinson) and data banks (NIST).

PERSONAL CARE COMPOUNDS IN THE ENVIRONMENT PATHWAYS, FATE, AND METHODS FOR DETERMINATION, edited by Kai Bester, 244 pages, Wiley-VCH Verlag GmbH & Co., Weinheim, Germany (2007). ISBN 978-3-527-31567-3. €120.56.

Personal care compounds (PCCs), such as cosmetics, pharmaceuticals, and household products, may represent a potential harm to the environment. Issues of the associated endocrine disruption and long-term (chronic) toxicology as well as ecosystem toxicology have emerged more clearly since the early 1990s. Tracking the sources of these toxic chemicals and their fate in the environment is therefore of prime concern for water and waste treatment authorities and for the manufacturers of such products.

This comprehensive treatment of the topic systematically covers the most important classes of toxic chemicals from personal care compounds, such as polycyclic musk fragrances, used in washing powders or shampoos, bactericides such as triclosan,

which is used in toothpaste, sportswear, etc., UV filters and sunscreens, tributyl phosphates or flame-retardants such as tris-(2-chloro- methyl-ethyl)-phosphate, the endocrine-disrupting nonylphenols, which are mostly used as plasticizers in epoxy resins or in surfactants as ethoxylate derivatives, and, finally, oestrogenic hormones and antibiotics.

Following an introduction to sewage-treatment-plant functions, the book goes in detail over the different classes of PCCs from the environmental standpoint, including their fate in wastewater treatment plants, and their occurrence in sewage sludges, surface waters, and coastal waters. Extensive information is provided from field studies carried out in German rivers, the German Bight, and the North Sea. For each substance, data on toxicity and bioaccumulation in various ecosystems are given as well as the appropriate analytical chemistry methods for their determination in fresh, marine, and wastewaters, with well-updated literature. The book concludes with a discussion of strategies in wastewater treatment to control and remove these substances.

This interesting and informative book should be highly appreciated by scientists, students, and people purely interested in the environmental sciences.

THE FATE OF PERSISTENT ORGANIC POLLUTANTS IN THE NORTH SEA. MULTIPLE YEAR MODEL SIMULATIONS OF γ -HCH, α -HCH AND PCB 153, by Tatjana P. Ilyina, 132 pages, Springer, Berlin (2007). ISBN 978-3-540-68162-5. €74.85.

Within the last two decades, the loading of the North Sea with pollutants such as nutrients, heavy metals, and oil has been intensely investigated. The main remaining challenges, with respect to both science and environmental policy, are understanding and handling the threat by organic contaminants, especially their spreading and fate. This task is the aim of this booklet, the doctoral thesis of the author, which presents an innovative model approach for investigating the spread of three major persistent organic pollutants (POPs) in the North Sea.

After a compilation of appropriate observational data, including spatial distributions within the North Sea and time series at single stations, a new Fate and Transport Ocean Model (FANTOM) for organic pollutants has been developed and tested. The key processes considered are the transport by ocean currents, air–sea exchange, phase distribution and degradation in sea water, and river and oceanic inflows. The calibrated model has been used for simulating the real POPs loads in the North Sea within the period 1995–2001. Further, scenario calculations are carried out for possible future states. The overall result is a new and comprehensive understanding of contaminant dynamics in the North Sea, including mass budgets and residence times estimates of γ -HCH, α -HCH, and PCB 153 in in sea water, and the assessment of the contribution of individual processes to the cycling of these POPs in the region.

The findings represent the best scientific basis presently available for assessing and controlling the spreading and fate of organic pollutants in the North Sea. Such an approach provides a valuable aid for national and European marine environmental policymakers. Moreover, this approach can be applied to endangered shelf seas in other parts of the world.

REVIEWS OF ENVIRONMENTAL CONTAMINATION AND TOXICOLOGY, Volume 189, edited by George W. Ware and David M. Whitacre, 185 pages, Springer, Heidelberg (2007). ISBN 978-0-387-35367-8. €99.46.

The role of this *Reviews* series is to publish detailed scientific review articles on all aspects of environmental contamination and associated toxicological consequences. Such articles facilitate the often-complex task of accessing and set interpreting cogent scientific data within the confines of one or more closely related research fields.

The present volume includes articles on Chemistry and fate of simazine, Ethanol production: energy, economic, and environmental losses, Arsenic behaviour from groundwater and soil to crops: impacts on agriculture and food safety, Health effects of arsenic, fluorine, and selenium from indoor burning of Chinese coal, Mercury content of hair in different populations relative to fish consumption, and Toxicology of 1,3-butadiene, chloroprene, and isoprene.

Reviews makes available to readers in an abridged form the staggering volume of scientific literature existing on key topics. Therefore, it will be appreciated by scientists and science or policy administrators, whether employed by government, universities, or the private sector, as well as by scholars interested in environmental issues.

BIOAVAILABILITY, BIOACCESSIBILITY AND MOBILITY OF ENVIRONMENTAL CONTAMINANTS, by John R. Dean, 292 pages, Wiley, Chichester, UK (2007). ISBN 978-0-470-02577-2. £85.00.

This book focuses on the methodologies for assessing the bioavailability and bioaccessibility of metals and persistent organic pollutants in environmental samples. It is organized in eight chapters as follows. Chapter 1 considers the link between human health and contaminated land. A particular focus of this chapter concerns the regulations placed on local authorities in England as a result of the Environmental Protection Act 1990. Chapters 2 and 3 consider the different analytical techniques, including sample preparation, applied to solid and liquid samples for trace metal and persistent organic pollutant analysis. A unique aspect of these two chapters is the undertaking of SWOT analyses to highlight the parameters that should be considered when choosing between the different approaches. Chapter 4 considers the different sample preparation techniques applied for single and sequential extraction of metals from soils and sediments; in particular, the use of the single extraction methods for metal bioavailability studies. Chapter 5 evaluates the different sample preparation techniques for non-exhaustive extraction (cyclodextrin, supercritical fluid extraction, sub-critical water extraction, solid-phase microextraction, and membrane separations) of persistent organic pollutants from soils and sediments. In addition, the use of bioassays, in the form of earthworms and plants, for assessing pollutants bioavailability is reviewed. Chapter 6 describes the different approaches for assessing the oral bioaccessibility of metals and persistent organic pollutants from solid environmental samples. Chapter 7 contains four case studies encompassing the uptake of metals (Cd, Cu, Mn, Pb, and Zn) by plants (lettuce, spinach, radish, and carrot) and persistent organic pollutants (α -endosulfan, β -endosulfan, and endosulfan sulfate) by lettuce grown in compost under greenhouse conditions, as well as the oral bioaccessibility of these pollutants from plants using an *in vitro* gastrointestinal extraction approach. The final chapter provides examples of forms that could be used to record laboratory information at the time of carrying out sample preparation and analysis of metals and

persistent organic pollutants. This chapter concludes with a guide of selected resources detailing lists of journals, books, and Web addresses.

The book is particularly arranged for supporting the open learning approach. Thus, the progress of the reader can be assessed by the use of frequent self-assessment questions (SAQs) and discussion questions (DQs), along with their corresponding reinforcing responses which appear throughout the text. Therefore, it will be a valuable and useful source of material for both individual students and teachers.

HPLC, A PRACTICAL USER'S GUIDE (2nd edition), by Marvin C. McMaster, 238 pages, Wiley, Chichester, UK (2007), ISBN 0-471-75401-3, £41.95.

This book was designed to help the beginning as well as the experienced chromatographer in using an HPLC system as a tool. Based on the proper practical experience of the author, this guide is divided into three parts. The first part discusses the advantages and disadvantages of HPLC, how to select the most appropriate system for a specific need, and how to keep it running. Part II discusses the various pieces of HPLC equipment and how to systematically troubleshoot system problems. It takes a look at the newest innovations and improvements in column technology and hardware specifics, like detectors, for the different chromatographic modes (e.g. reverse-phase, ion exchange, size exclusion, etc.) and how to put these to work on research. Finally, Part III gives an overview on systematic methods development, both manual and automated, and how to interface the HPLC system to computers and robotic workstations. The latest information and techniques in high-temperature, micro flow, and ultra-fast chromatography, as well as the linking of an HPLC to a mass spectrometer, represent just some of the new material featured in this second edition.

This is a book highly oriented to practice, full of tips and troubleshooting advice originated from the author's own laboratory and fieldwork. A CD-ROM with the author's PowerPoint presentation 'Practical course in HPLC', is also included, together with a series of appendices offering answers to frequently asked questions, tables of solvents and volatile buffers, an updated glossary of terms, and laboratory experiments.

FUNDAMENTALS OF ENVIRONMENTAL SAMPLING AND ANALYSIS, by Chunlong Zhang, 436 pages, Wiley, Hoboken, NJ (2007). ISBN 978-0-471-71097-4. £55.95.

The overall objective of this book is to provide a comprehensive introduction to the subject. It is not intended to be a cookbook that presents the step-by-step details. Rather, fundamentals of sampling, selection of standard methods, chemical and instrumental principles, and method applications to particular contaminants are detailed. The book contains chapters on environmental sampling (Chapters 2–4)—where and when to take samples, how many, how much, and how to take samples from air, liquid, and solid media. Chapter 5 introduces the standard methodologies by the US EPA and other agencies. Quality assurance and quality control (QA/QC) for both sampling and analysis are also included. Chapter 6 details the chemical principles of wet chemical methods most commonly used in environmental analysis. Sample preparation methods are discussed and compared in Chapter 7. In Chapter 8, the theories of absorption spectroscopy for qualitative and quantitative analysis are presented. Chapter 9 is devoted to metal analysis using various atomic absorption and emission

spectrometric methods. Chapter 10 focuses on the instrumental principles of gas chromatography, high-performance liquid chromatography, and ion chromatography. Chapter 11 introduces the electrochemical principles and instrumentations for some common environmental analysis, such as pH, potential titrations, dissolved oxygen, ion-selective electrodes, conductivity, and metal analysis using anodic stripping voltammetry. Chapter 12 introduces various hyphenated mass spectrometries such as ICP/MS, GS/MS, and LC/MS. This last chapter concludes with a brief introduction to nuclear magnetic resonance spectroscopy and specific instrumentations including radiochemical analysis, electron scanning microscopes, and immunoassays.

As a particular feature, it includes questions and exercise problems in each chapter to help to understand these concepts. Suggested readings are also given for those who need further information or specific details from standard handbooks (EPA, ASTM, OSHA, etc.) or journal articles. Practical tips are given in most chapters for those who want to advance in this field. Finally, a total of 15 experiments covering data analysis, sampling, sample preparation, and chemical instrumental analysis are provided for use as a supplemental lab manual. Therefore, the book is especially suited for students in environmental science and engineering as well as environmental professionals who are involved in various stages of sampling and analytical work, including the use and interpretation of environmental data for various purposes.

COLUMNS FOR GAS CHROMATOGRAPHY. Performance and Selection, by Eugene F. Barry and Robert L. Grob, 298 pages. John Wiley & Sons, Inc., Hoboken, New Jersey, USA. ISBN 978-0-471-74043-8. £ 55.95.

Over the past three decades the nature and design of gas chromatographic columns have changed considerably. Packed columns have been substituted by open capillary with an outstanding increase in resolution. After a general introduction, the book contains three chapters reviewing packed and capillary column gas chromatography (GC) and column oven temperature control.

The apparently old-fashioned issue of the performance of packed columns discussed in chapter 2 draws the attention about the fact that there is a substantial subset of gas chromatographic methods using these columns, and therefore requiring an updating. This is illustrated with an extensive tabulation of United States Pharmacopeia and National Formulary methods and an Appendix consisting of 160 packed column separations that now form the Supelco's Brochure 890B. Innovations and advances in high resolution GC, with special reference to the column preparation and performance assessment and selection of the stationary phase, are discussed in chapter 3, with the merits of the fused-silica columns as the focal point. A handy list of column dimensions for ASTM, EPA and NIOSH methods is also included. Finally, chapter 4 refers to the increasing popularity of high-speed or fast GC and the increasing presence of GC-MS in the analytical laboratory, especially for environmental, food, flavour, and toxicological analyses. Additional special features like the advantages of computer assistance in gas chromatography, multidimensional GC, useful hints for successful GC, and GC resources on the Internet are also surveyed.

This book provides the necessary guidance for column selection and type of column chosen with the injection system and detectors in mind. Properly implemented connections of the column to the injector and detector and the presence of high

boilers, particulate matter in samples, and so on, are included for enhancing the abilities of the novice with this analytical technique as well as those experienced in the use of GC.

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