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### Book Reviews

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## Book Reviews

**Elements of Environmental Chemistry**, by Ronald A. Hites, Wiley, Hoboken, NJ, 2007, 204 pp., £22.50, ISBN 978-0-471-99815-0

Many environmental chemistry books cover the topic from a descriptive or phenomenological point of view. However, we must remember that environmental chemistry is a quantitative science; environmental observations need to be quantified to assess spatial or temporal trends, fluxes, processes rates, etc. Thus, a good textbook for environmental chemistry should also develop students' quantitative skills. This book is distinctive from the classical ones in the sense that it focuses on methods of approaching quantitative estimates. Starting from very simple case studies like the estimate of how many people work in McDonalds in the world, it uses real examples to help readers master the quantitative aspects of environmental chemistry. Complex environmental issues are presented in simple terms to help readers grasp the basics and solve relevant problems. It offers a quantitative approach to the topics covered, namely, steady- and non-steady-state mass balance modelling, chemical kinetics, stratospheric ozone, photochemical smog, the greenhouse effect, carbonate equilibria in rain and surface waters, the application of partition coefficients of organic compounds between air, water, sediments and biota to assess their environmental fate, and toxic pesticides and metals.

This short book is aimed to be tutorial and informal. For each story problem, a strategy is developed and the solution provided. It is an interactive textbook, and it is intended to be read with a pencil in hand so that the student can follow along with the problem statement, the strategy for solving the problem and the calculations used in arriving at an answer.

In addition to the problems in the text, each chapter ends with a problem set covering the quantitative aspects of the material. Answers to these problems are at the back of the book, and full solutions to the problem set questions are available on the John Wiley & Sons website (<http://www.wiley.com>).

This book is a stand-alone text, aimed at upper-level undergraduate chemistry or chemical engineering majors or at first-year graduate students with only a modest physical science background. Because of its tutorial nature, it would also make a good self-study text for entry-level professionals.

**A Practical Guide to Instrumentation, Methods and Applications**, by M.S. Maldi, edited by Franz Hillenkamp and Jasna Peter-Katalinić, Wiley-VCH, Weinheim, Germany, 2007, 345 pp., €92.52, ISBN-13 978-3-527-31440-9

The practical use of MALDI-MS has grown almost exponentially and, together with electrospray ionisation, is today an indispensable tool, particularly in the life sciences. This book is meant as a practical guide, and consequently much emphasis has been placed on providing practical, usable information rather than a basic understanding of the underlying mechanisms. The content of the book is arranged accordingly, concentrating essentially on the main fields of application.

Following a brief presentation of the technique's historical background, Chapter 1 contains a condensed presentation of the physico-chemical mechanisms that are active in the MALDI process. Emphasis is placed especially on the impact that these mechanisms have on practical applications, for example in the case of ion fragmentation or the analysis of non-covalently bound complexes. Chapter 2 is devoted to aspects of MALDI-MS instrumentation, including the ion sources, lasers, and the very different types of mass analyser which are currently in use for MALDI-MS. The aim of this chapter is to help users selecting the best instrument for any successful application of the method. The following chapters are devoted to the main fields of application for MALDI-MS. Protein/peptide analysis, which is discussed in Chapter 3, remains the most prevalent application, and it is in this field that the majority of technical developments of MALDI have taken place during recent years. Microprobing and biomarker detection, both of which are discussed in Chapter 4, are more recent fields of application, with its achievements and limitations. MALDI-MS analysis of nucleic acids is described in Chapter 5. Glycans and lipids – the subjects of Chapters 6 and 7, respectively – are two major classes of biological molecules where the use of MALDI-MS as an analytical tool is expected to undergo considerable expansion in the near future. Chapter 8 addresses the problems encountered in the analysis of very different classes of synthetic polymers and mass distributions, and concentrates on practically useful procedures. The analysis of small molecules, which is described in Chapter 9, is not strictly a MALDI-based treatment but has been of importance in the development and screening of new pharmaceutical agents.

The book is accurately edited, with colourful illustrations and updated references. It is easy to read and will be a much-needed practical and educational asset for individuals, academic institutions, and companies in the field of bioanalytics.

**Quality Assurance in Analytical Chemistry, Second Edition**, by W. Funk, V. Dammann and G. Donovert, Wiley-VCH, Weinheim, Germany, 2007, 277 pp., €88.79, ISBN-13 978-3-527-31114-9

In more than a decade since the appearance of the first edition of this book, analytical chemistry has not only undergone enormous scientific development due to technological progress but witnessed a broadening in its range of applications, and has in part become a service that extends beyond its traditional boundaries. In parallel, awareness of the quality of analytical results has also increased. The procedures of analytical quality assurance (QA) described in the first edition of this book have now been further developed and amended.

This second edition accommodates all new requirements of QA. Following an introduction on the general differentiation of analytical processes, the text goes on to explain the four-phase model of analytical QA, such as:

- Phase I: The quality characteristics of a new analytical process. All concepts involved, including fundamental calibration, detection limit, limit of quantification, recovery calculations, trend tests, etc. are well defined and illustrated by examples.
- Phase II: Preparative quality assurance, so as to make a verified analytical process available for routine analysis. This includes achieving and maintaining sufficient analytical quality before routine analysis begin.
- Phase III: Routine QA, encompassing all internal QA measures of routine analysis (e.g. control charts), ensuring comparability of analytical results.
- Phase IV: External analytical quality assurance in the form of interlaboratory tests and external audits.

To provide concrete assistance during day-to-day work in the laboratory, this new edition is enhanced by a chapter on the important topical subject of measurement uncertainty, plus a CD-ROM with interactive examples in the form of Excel spreadsheets. These allow readers to gain an even better understanding of the statistical procedures for QA while also incorporating their own data.

This is a comprehensive and authoritative book, remarkably well written, and incorporating the latest international standards in the field, that should be a reference in academic, industrial, and research laboratories.

**Environmental Values**, by John O'Neill, Alan Holland and Andrew Light, Routledge, Taylor & Francis Group, London, 2008, 233 pp., £20.99, ISBN 978-0-415-14509-1

This is a book about the environment and about values, an attractive and compelling introduction to environmental ethics. As indicated in the Introduction, we live from the world, in the world, and with the world, confronted by mounting environmental problems, such as increasing global deforestation and desertification, loss of species diversity, pollution and global warming, etc. Underlying these problems, there are conflicting priorities and values, concerning both citizens and policy makers. However, dominant approaches seem ill equipped to capture the various ways in which the environment matters to us.

On response to the problem of value conflict *Environmental Values* introduces readers to these issues by presenting, and then challenging, two dominant approaches to environmental decision making, one from environmental economics and the other from environmental philosophy.

In the first part of the book, the authors present a sustained case for questioning the underlying ethical theories of both of these traditions, the first associated with utilitarianism, aiming at policies maximising welfare of affected agents through the use of cost-benefit analysis, and the second involving the extension of the class of beings to whom moral consideration is owed and the recognition that non-human nature has intrinsic value.

In part two, the authors critically examine the need for a new environmental ethic based on a form of pluralism about values which is sceptical of the attempt to understand ethical reflection in terms of moral obligations that are derived from sets of

ethical primitives, and argue for the importance of history and narrative in environmental valuation.

In the third part of the book, they develop those claims in more detail and examine their implications for environmental policy making. In the final chapter, they expand on our account of the role of history and narrative in environmental value through consideration of some everyday nature conservation problems, such as biodiversity, conservation, and sustainability.

The authors defend a pluralistic alternative rooted in the rich everyday relations of humans to the environments they inhabit, providing a path for integrating human needs with environmental protection through an understanding of the narrative and history of particular places.

This stimulating book is written for an interdisciplinary audience. It will be ideal for student use in environmental courses in geography, economics, philosophy, politics, and sociology. It will also be of wider interest to policy makers and the concerned general reader.

**Environmental Degradation and Transformation of Organic Chemicals**, by Alasdair H. Neilson and Ann-Sofie Allard, CRC Press, Taylor & Francis Group, Boca Raton, FL, 2007, 710 pp., £79.99, ISBN 0-8493-7241-0

Degradation and transformation pathways are fundamental in assessing the environmental impact of organic contaminants. In this volume, emphasis is placed on the pathways by which these processes have taken place, and the approach is essentially chemical and mechanistic. The book examines a wide range of compounds as well as abiotic and microbiological reactions mediated by microorganisms and the broad classes of enzymes involved. It provides an overview of experimental procedures with detailed coverage of the organic compounds that are considered to be xenobiotics.

The book begins by providing a broad perspective on abiotic and biotic reactions, with special emphasis on photochemically induced reactions and aerobic and anaerobic biodegradations, including the mechanistic aspects and the significance of a range of environmental determinants. The following chapters briefly introduce field and laboratory experimental procedures and emphasise those procedures for establishing the structure of metabolites using isotopes and physical methods. Next, the authors outline details of biochemical reactions involved in the biodegradation of the major groups of aliphatic, carbocyclic aromatic, and heterocyclic compounds. Although emphasis is placed on the pathways, rather general accounts of the enzymes involved and the genetics are provided where available. The final chapters deal with bioremediation that has attracted increasing concern because of the hazard presented by the disposal of unwanted chemicals, or by products from their manufacture. The evaluation of bioremediation and applications to different wastes (e.g. oil residues, agrochemicals, chemical and military wastes, etc.) are described in detail. These chapters should be viewed within the wider context of metabolic details that have been presented in previous ones.

Broad and comprehensive, this book provides a cohesive treatment of the subject. It contains an extensive set of literature references and numerous illustrative figures. The principles that emerge provide a guide not only for specific compounds but also for those having a more remote structural resemblance. Environmental professionals and students will enjoy its lecture.

**Ion Exchange and Solvent Extraction**, by Vol. 18, edited by Arup K. Sengupta, CRC Press, Taylor & Francis Group, Boca Raton, FL, 2007, 418 pp., £115.00, ISBN 0-8493-7397-2

This volume offers an updated perspective on the current and potential capabilities of ion-exchange materials in today's most cutting-edge applications. It contains seven chapters written by professionals from academic institutions, research laboratories, and industries around the world.

Chapter 1 discusses how solvent sorption equilibria and kinetics vary with the elastic properties of ion-exchange resins, which, in turn, are dependent on the type of functional groups, ionic forms, polymer matrix composition, and the degree of cross-linking. Ion-exchange resins can serve as the heart of many processes by simultaneously acting as a catalyst (or a reactant) and a separating agent. Development and modelling such a chromatographic reactor-separator and, more specifically, the simulated moving bed reactor (SMBR) is the primary objective of Chapter 2. Chapter 3 discusses various scenarios of drug delivery for a combination of drugs and ion-exchange resins. In addition, the chapter attempts to elucidate how the process variables, namely, temperature, ionic strength, pH, molecular weight of the drug and cross-linking in the resin influence the overall process of drug delivery. The importance of designing and preparing support materials for catalysts, especially for metal catalysts, is described in Chapter 4. The chapter provides extensive coverage for preparation, usage, and performance evaluation of biopolymers as catalyst supports with particular emphasis on chitosan, and includes many examples of reactions, namely, hydrogenation, oxidation, reduction, hydroxylation, and carbonylation catalysed by biopolymer-supported catalysts. Chapter 5 provides convincing experimental evidence and elucidates underlying scientific reasons to confirm that ion-exchange selectivity data for various ions can be used as surrogate parameters to predict the relative permeability of different ions in reverse osmosis and nanofiltration processes. Chapter 6 provides a detailed account of how chitosan and its modified forms can find applications in separation and purification of metal ions. Finally, chapter 7 provides specific advantages of short-bed ion-exchange units (faster kinetics with an acceptable pressure drop) and presents many novel applications of ion exchange besides the well-known water demineralisation and removal of target-contaminating ions.

In summary, this volume reflects the remarkable breadth of applications inspiring the latest advances, featuring carefully selected contributors in areas including catalysis, molecular imprinting, drug delivery, nanotechnology, green processes, water treatment, and pollution control. The book may be of interest to analytical and physical chemists, process chemists and engineers, and biotech and environmental chemists.

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