

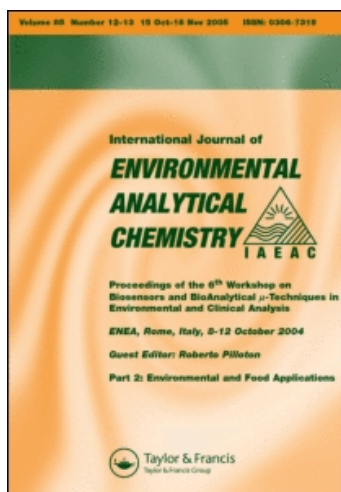
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### Book Review

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## BOOK REVIEWS

ENVIRONMENTAL SOIL AND WATER CHEMISTRY, by V.P. Evangelou, 564 pages, Wiley Interscience, New York (1998). ISBN 0-471-16515-8. £ 51.95.

The book presents an overview of the principles and applications of soil science, addressing the subject by viewing the fundamentals for understanding soil-water chemistry and the interactions between soil and water as a basis for understanding the nature, extent, and treatment of polluted soils and water.

The book consists of two major sections: Principles and Applications. The Principles section is divided into the following parts: I. Water Chemistry and Mineral Solubility; II. Soil Minerals and Surface Chemical Properties; and III. Electrochemistry and Kinetics. The Applications section also covers several subject areas: IV. Soil Dynamics and Agricultural-Organic Chemicals; V. Colloids and Transport Processes in Soils; VI. Land-Disturbance Pollution and Its Control; VII. Soil and Water: Quality and Treatment Technologies. Each subject area contains one to three chapters.

Suitable for advanced undergraduates and beginning graduate students the book offers a handy reference on wide spectrum of environmental problems and is tailored specifically to disciplines of soil science, environmental science, agricultural and environmental engineering and environmental geology.

ENVIRONMENTAL TRANSPORT PROCESSES, by B.E. Logan, 654 pages, Wiley Interscience, New York (1999). ISBN 0-471-18871-9. £58.50

Transport processes are usually described from the perspective of chemical production. Mathematical models developed in this context are then restricted to systems that are defined and well controlled. However, transport problems derived for environmental systems must focus on making calculations in highly heterogeneous, and often poorly defined, environments. This is the issue addressed in this book. Structured to suite a one-semester introductory course on the subject, it begins with the basics of molecular diffusion and chemical partitioning and then progresses to more advanced topics including the concept of dispersion, and classical transport calculations.

The main purpose of the detailed derivations is to give the student some exposure to solving differential equations and applying these solutions to the calculation of chemical fluxes. Once the mathematics of mass transport calculations have been covered, the transition is made to the use of mass transport correlations in both natural systems and engineering reactors. The concepts of fractals and biofilms are developed and then merged with kinetic models and transport equations.

Chemical dispersion in contrast to simple chemical diffusion is a relevant environmental process in lakes, rivers and subsurface waters as well as in engineered systems. In this respect, the last chapters provide a gateway to specialized studies in particle removal and transport, and the foundation of mass transport calculations important in virtually all water and wastewater treatment systems. Each chapter draws on realistic examples and problems to reinforce important concepts.

In summary, this book provides practicing engineers and graduate students with a comprehensive introduction to transport processes in environmental systems.

**MERCURY CONTAMINATED SITES.** Characterization, risk assessment and remediation, edited by R. Ebinghaus, R.R. Turner, L.D. de Lacerda, O. Vasiliev and W. Salomons, 538 pages, Springer-Verlag, Berlin (1999). ISBN 3-540-63731-1. DM 198.00. USD 129.00

Mercury is continuing to be an element of major environmental concern, with implications at local, regional and global scales. This book summarizes the contributions initially presented at the 4<sup>th</sup> International Conference on Mercury as a Global Pollutant, held in Hamburg in 1996. Information is provided on the characterization, risk assessment and remediation of mercury-contaminated sites in the European, Asian and American continents.

The first part includes review chapters on natural and anthropogenic emissions of mercury to the atmosphere in the context of regional and global budgets; the contrasting impacts at both active and inactive mercury-contaminated sites in North America, Japan (Minamata) and Europe (Almaden, Idrija and Mt. Amiata); the environmental impact of the amalgamation technique for extraction of gold; remediation techniques for soil at contaminated sites as well as technologies for removing mercury in gases from metallurgical industries; and, finally, on the behaviour of mercury species in biological systems.

The second part is devoted to a large variety of case studies collected under the following general topics: industrial sites, mining, emissions and atmospheric dispersion, remediation and mercury contamination in aquatic systems.

The various chapters clearly show that each contaminated site has its own history of pollution and, furthermore, that the risks associated with mercury depend on site-specific biogeochemical conditions. On the other hand, it appears that no universal treatment procedure is available and the selection of the most effective one should be made on a site by site evaluation.

ENVIRONMENTAL PHOTOCHEMISTRY, edited by P. Boule, 359 pages, Springer-Verlag, Berlin (1999). ISBN 3-540-62913-0. DM 298.00

This is Vol. 2L of *The Handbook of Environmental Chemistry*, edited by O. Hutzinger. A series that has been covering since the last 20 years and over the 30 volumes published relevant aspects of the natural environment and the biogeochemical cycles therein, as well as the occurrence, reactions and processes of the anthropogenic compounds.

The present volume, included in the section reactions and processes, contains 11 contributions on different aspects of photochemical mechanisms and processes of environmental relevance. Although the individual contributions are consistent the collection of topics is rather disperse, partially because it is evidently not possible, in just several hundred pages, to give a complete overview of the topic. Thus, on one hand the book reports on some recent results of the solar spectrum and the recent techniques for the analysis of short-life reactive species, and, on the other, on the phototransformation of aquatic pollutants, namely PAHs, PCBs, phenols, pesticides and those induced by nitrate ions, Fe(III) salts and humic substances in surface waters. In summary a book for the library and for introductory courses to the field.

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A BEGINNER'S GUIDE TO MASS SPECTRAL INTERPRETATION, by T. A. Lee, 186 pages, John Wiley & Sons, Chichester, (1998). ISBN 0-471-97629-6 USD 19.99

This book provides a clearly written and timely introduction to the interpretation of Electron Impact (EI) mass spectra for undergraduates and practitioners in the field of analytical mass spectrometry. The overall clarity of writing and quality of the presented step-by-step guide to identification of organic compounds by mass spectrometry is excellent. The book should appeal especially to those interested in a clear introduction into the art of structure elucidation from electron impact mass spectra.

The book begins with a detailed chapter on isotopic abundances and how to use them to deduce molecular formulae. Identification of the molecular ion and general interpretation procedures like calculation of the saturation index or double-bond-equivalent are treated in Chapters 2 and 3 with an ample abundance of examples and practice problems. Chapters 4 – 12 cover the most major fragmentation reactions of common organic compound classes. Chapter 4 on hydrocarbons, Chapter 5 halogenated hydrocarbons, Chapter 6 alcohols, Chapter 7 ethers and phenols, Chapter 9 esters and acids, Chapter 10 nitrogen-containing compounds, Chapter 11 thiols and thioethers and Chapter 12 on heterocyclic compounds. All of these chapters start with several pages of examples of mass spectra of a series of homologous compounds from the compound class to be studied in the chapter. The general fragmentation reactions of the compound class are then subsequently treated in a few pages of text. I found the large amount of mass spectra (145) a nice feature of this book because it provides the interested reader with a wealth of opportunity to interpret and ponder the spectra. With regard to the presentation of the mass spectra though, a small point of criticism can be added that the abscissa (mass-axis) of the mass spectra consistently is not divided in multiples of 1, 5 or 10 but in seemingly random numbers and that sometimes unusual increments like 6 are used to divide the mass axis. This, unfortunately, does not add to the readability of the mass spectra. The book concludes with a section where 20 'unknowns' are presented as well as detailed solutions to these unknowns.

Due to its clarity of writing this book will serve as a good introduction into the field of interpretation of mass spectra of organic compounds.

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TECHNIQUES IN AQUATIC TOXICOLOGY, edited by Gary K. Ostrander, 686 pages, CRC Press, Boca Raton, Florida. (1996). ISBN 1-56670-149-X, £ 65.00

This book covers a series of detailed protocols for techniques currently in use in the field of aquatic toxicology. The book is divided into 35 chapters, grouped in four broad sections, which include techniques for the assessment of toxicity in whole organisms (section I), cellular and subcellular toxicity (section II), identification and assessment of contaminants in aquatic ecosystems (section III), and finally, several useful techniques surprisingly classified as "Techniques for aquatic toxicologists" (section IV). Each individual chapter covers a particular method or procedure and begins with a brief introduction of the technique; there-

after, the Materials and Procedures sections provide the reader with a list of necessary materials and detailed explanation of the technique. Finally, the reader can find typical results and comments on the potential utility of the discussed technique in the Results and Discussion sections.

In summary, the book is a comprehensive compilation of techniques and protocols, from molecular biology to the detection of toxicants in biological tissues, from toxicity tests to the design of aquatic mesocosms and microcosms. The choice and treatment of the techniques is excellent, and the book can be a useful tool for aquatic chemists and toxicologists willing to implement a new technique in their laboratories. Nevertheless, although explanations are very good and detailed, the reader must already be familiar with the topic in order to be able to establish the technique in his/her laboratory without further consultation.

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**HANDBOOK OF CHEMOMETRICS AND QUALIMETRICS. Part B**, by D.L. Massart, L.M.C. Buydens, S. de Jong, P.J. Lewi and J. Smeyers-Verbeke, 732 pages, Elsevier, Amsterdam (1998). ISBN 0-444-82853-2. USD 201.00

The present book is the second part of a general handbook on Chemometrics. The first (Part A) was devoted to univariate techniques since they are those currently involved in the acquisition of knowledge by experimental methods. This second part is focused on the transformation of data and results into information and the combination of information into knowledge. Therefore, the emphasis is put on multivariate methods.

This Part B has a first chapter on matrix and vector operations. Then, some comprehensive chapters on Principal Component Analysis, Factor Analysis, Cluster Analysis, Correspondence Factor Analysis and Supervised Pattern Recognition. In addition to these "basic" chapters other "applied" topics are developed such as Data Comparison and Multivariate Calibration. Techniques such as Procrustes Analysis, Canonical Correlation Analysis, Multivariate Least Squares Regression, Reduced Rank Regression, Principal Component Regression, Partial Least Squares Regression and Continuum Regression are considered for these topics. Other chapters devoted to specific applications involve Quantitative Structure-Activity Relationships, Analysis of Sensory Data, Pharmacokinetic models, Kalman Filtering, Artificial Intelligence, Neural networks and Signal processing. This last topic has an extensive description of the Fourier transform and also considers the Hadamard, Time-Frequency Fourier and Wavelet trans-

forms. The Maximum Likelihood and Maximum Entropy deconvolution methods are also included.

All chapters are written for non-specialists having some interest in learning the fundamentals of the techniques. The authors have a consolidated experience in the field which allows them to focus the description of these “mathematically obscure” techniques in most comprehensive ways. The chapters devoted to applications may even be useful to beginners in each topic. However, the amount of information provided goes far beyond initial application steps.

This book will be particularly useful to people operating with statistical packages wanting to understand the rationale of the diverse multivariate methods of choice as well as the mathematical implications of the different options offered for the calculations.

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