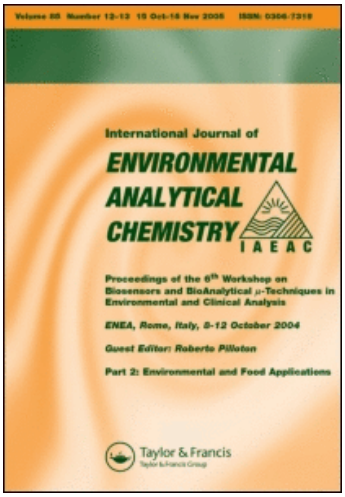

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Book Reviews

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BOOK REVIEWS

HYDROCARBON CONTAMINATED SOILS AND GROUNDWATER, edited by P. T. Kostechi and E. J. Calabrese (University of Massachusetts at Amberst, USA), Vol. 2, 558 pages. Lewis Publishers Inc., Chelsea, MI, USA (1992). ISBN 0-87371-603-5. Vol. 3, 657 pages. Lewis Publishers Inc., Chelsea, MI, USA (1993). ISBN 0-87371-933-6.

Hydrocarbon contaminants in soils and groundwater have emerged as important environmental issues to both the public and private sectors in the past ten yeas. The challenges to develop new techniques and to study issues from a resolution perspective rather than solely from a theoretical perspective, are illustrated in these books.

They correspond to a series of conference proceedings edited by the authors who have also published several other volumes on the same topic (see, for example, *Internat. J. Environ. Anal. Chem.*, **49**, 240, 1992).

The contributions are grouped in the following sections: Sampling and site assessment; environmental fate and modelling; remediation assessment and design; risk assessment and risk management. Hydrocarbons include from volatile solvents (naphthas or BTX) to heavy residues. A number of remedial strategies employing techniques and methodologies are extensively covered, probably the most interesting part of this book series.

The majority of authors are from the consulting industry. Thus, addressing the issues in an environmentally sound, cost-effective and practical manner. Therefore, the books can be used as a helpful tool for finding solutions to real world situations, at sites with soil and groundwater contamination.

Although the presentations of the different case studies are covered at irregular levels, the books contain valuable and up-dated technical and regulatory information. An extensive subject index may help the reader in localising their topics of interest. However, he will also find that many of the references given correspond to internal reports that will be difficult to obtain.

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THE SCIENCE OF GLOBAL CHANGE: THE IMPACT OF HUMAN ACTIVITIES IN THE ENVIRONMENT, edited by D. A. Dunnette and R. J. O'Brien (Portland State University) 506 pages, ACS Symposium Series 483, ACS Washington DC, USA (1992). ISBN 0-8412-2197-9. 99.95 US $.

This book is an exhaustive revision of the main problems in the planetary environment originated as consequence of human activity. The book is divided in six major sections: the global environment, the atmospheric component, the aquatic component, the terrestrial component, global carbon cycle and climate change and global environmental chemistry education. 26 chapters distributed among these sections cover all the major topics related with global change. The chapters are written by different authors. Among them, it is worth mentioning: Stratospheric Ozone, Acid Deposition, Tropospheric Chemical Reactivity and Its Consequences for Clean and Polluted Air, Potencial Effects of Increased Ultraviolet Radiation on the Productivity of the Southern Ocean, Assessing Global River Water Quality, Global Significance of Biomethanogenesis, Pesticides and the World Food Supply, Climatic Feedbacks in the Global Carbon Cycle, Biogeochemistry of Deforestation and Biomass Burning. Several of the authors of these chapters are leading specialists in their area of research.

As indicated in the introduction, the book is devoted to the scientific literate non-specialists. I think that the authors have succeeded in providing a series of scientifically acurate chapters that, at the same time, are easily understandable to people outside the specific discipline. In summary, this book is highly recommended for scientists who wants to be updated in the state-of-the-art of the main environmental problems identified to date.

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CHEMISTRY AND ANALYSIS OF VOLATILE ORGANIC COMPOUNDS IN THE ENVIRONMENT, edited by H. J. Th. Bloemen and J. Burn, (Dutch Institute of Public Health and Environmental Protection, RIUM, The Netherlands), 290 pages, Blackie Academic and Professional, London, UK (1993), ISBN 0-7514-0000.9. £65.00

This book is an intensive and exhaustive revision of the state-of-the-art of the environmental implications of volatile organic compounds. Aspects such as exposure levels of human population, public health effects, air, water and soil pollution, future analytical methods and occupational health are extensively described in separate chapters each written by a leading specialist in the specific domain. The chapters are written in an easily and readable style but at the same time they are exhaustive descriptions of the recent advances performed in each related topic. The long list of literature references included at the end of each chapter witness the dedicated work of the authors. The overall work gives a good estimate of "who is who" in the recent studies on volatile organic compounds. In short, I think that the present book deserves to be at the desk of all specialists interested in volatile organic compound chemistry.

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ORGANIC SUBSTANCES IN SOIL AND WATER: Natural Constituents and their Influences in Contaminant Behaviour, edited by A. J. Beck and K.C. Jones (Environm. Sci. Div., Lancaster University, UK), M. H. B. Hayes (School of Chemistry, University of Birmingham, UK) and U. Milgengrin (Inst. of Soils and Water, Volcani Center, Bet Dagan, Israel), 200 pages. The Royal Society of Chemistry, Cambridge, UK (1993). ISBN 0-85186-635-2. £55.00.

The present volume contains the keynote lectures presented at the International Conference on Organic Substances in Soil and Water, held in Lancaster (UK) on September 1992. The traditional prediction model of contaminant behaviour in soils and water based on their distribution in a two phase system was modified in the eighties by the inclusion of the third phase, namely DOM, which is implicated in the behaviour of many compounds and particularly those that are extremely hydrophobic.

In the first part of the book (chapters 1–3) the significance, distribution, composition and structure of organic matter in soils, streams and groundwaters is extensively presented. The problems of equating fulvic and humic acids with DOC are particularly highlighted and the gaps in understanding the composition and functionalities of this organic matter fraction are identified. In the second part (chapters 4–7), the emphasis of discussion is placed on the multitude of interactions that are possible between contaminants and naturally occurring organic substances. The need for improving our understanding of sorption/desorption kinetics for organic chemicals in soils and sediments is particularly stressed. Discussions on the subsurface transport of DOM and its implications to contaminant mobility (chapter 8) and modelling of the sorption/desorption processes (chapter 9) are also included.

In the final chapter the editors summarize the advances in the field and make suggestions for the direction of future research. This is, certainly, a brief but timely and interesting reading for graduates and researchers in environmental and agricultural chemistry.

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SUPERCRITICAL FLUID EXTRACTION AND ITS USE IN CHORMATOGRAPHIC SAMPLE PREPARATION, edited by S. A. Westwood (Horseracing Forensic Laboratory Ltd, Newmarket, U.K.), 168 pages. Blackie Academic & Professional, an imprint of Chapman & Hall, Glasgow, U.K. ISBN 0-7514-0089-0. USA and Canada CRC Press, Inc, Boca Raton, FL 33431. USA. ISBN 0-8493-7107-4. £. 45.00.

This book covers both, fundamental and methodological aspects of supercritical fluid extraction (SFE). While the first chapter gives a general introduction to SFE, emphasising the fundamental aspects (SFE modelling under different conditions), chapters from the second to sixth are dealing with methodology and instrumentation. Both, off-line SFE and its hyphenation to chromatographic techniques (i.e. GC, HPLC, capillary and packed column SFC) are presented. Particularly, the interphases and the analytical strategies used for coupling every chromatographic technique to SFE are reviewed in a great deal of details, particularly the optimisation procedures of every hyphenated system.

Consequently, this book gives a remarkable coverage of the potential of SFE and its capabilities for its interfacing to chromatographic separation techniques. Certainly, it would

be of interest not only to the potential users. Many of the experienced laboratories can gain a broader view of the capabilities of the SFE as a sample preparation technique.

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PROPERTIES OF ORGANIC COMPOUNDS. CRC Data base. 1993. Boca Raton, Florida, USA. version 3.1, 1 computer optical laser disk, 4¾ inch, software issued on 3½/3 and 5¼/3 diskettes, 1 manual. System requirements: IBM or compatible with 8036 microprocessor, 2MB RAM DOS 3.1 or higher, windows 3.1, MS Word for Windows, version 2.0 recommended, hard drive with 2 MB available space, high-density disk drive, CD-ROM drive using Microsoft extentions, VGA monitor.

This is a single source of physical and spectral data for approximately 27,000 organic compounds. The following physical properties are given for every single compound: molecular weight, melting point, boiling point, density, refractive index, colour, specific rotation and solubility. Further spectral data such as mass spectra, IR, Raman, UV, and ^{1}H and ^{13}C shifts are also reported. Moreover, chemical structures are available for almost 16,000 compounds.

Available data for a specific compound can rapidly be displayed by entering the CAS Number or the compound name. Data for compounds can also be retrieved by searching on physical properties or spectral peaks.

This "look here first" data base is very useful for synthetic and analytical laboratories that deal with organic compounds. Particularly attractive will be for readers interested in modeling environmental fate of pollutants.

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ILLUSTRATED HANDBOOK OF PHYSICAL-CHEMICAL PROPERTIES AND ENVIRONMENTAL FATE OF ORGANIC CHEMICALS. Volatile Organic Compounds, Vol. 3, by D. Mackay, W. Y. Shiu and K. C. Ma. (University of Toronto, Canada), 916 pages. Lewis Publishers, Chelsea, Michigan, USA, 1993. ISBN 0-83731-973-5.

This is the third volume of a series of Handbooks containing a compilation of physical-chemical data for similarly structured chemicals which influence their fate in multimedia environments (air, water, soils, sediments, and biota). Particularly, this volume focus on volatile organic chemicals (VOCs), namely, hydrocarbons (alkanes, cycloalkanes, alkenes, dienes, alkynes, cycloalkanes, aromatic hydrocarbons), halogenated hydrocarbons and ethers (aliphatic, aromatic and halogenated).

The way of grouping properties in series of structurally related compounds enables to validate the input data used in modeling since systematically vary with molecular size and

also can be useful for modest extrapolations for unreported data of homologs. The data are taken to estimate the partitioning behaviour of chemicals in the different compartments of the biosphere and the results are numerically and graphically presented. The prediction capability can be approached at different levels of calculation using simple fugacity models from the input data available but it must be emphasised that it is restricted to evaluative or generic environments.

Certainly, this book is extremely useful for the environmental scientists and engineers since it contributes to a better assessment of chemical fate in our multimedia environment and because it brings together a large variety of data relevant in environmental chemistry.

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AQUEOUS SOLUBILITY: Methods of Estimation for Organic Compounds, by S. H. Yalkowsky, (College of Pharmacy, the University of Arizona, Tucson, USA) and Sujit Banerjee, Manager of the Analytical Chemistry (Institute of Paper Science and Technology, Atlanta, Georgia, USA), 264 pages. Marcel Dekker, New York (1992), ISBN 0-8247-8615-7.

This useful book extensively reviews techniques for estimating water solubilities of organic nonelectrolytes covering both, simplistic methods, which are adequate for a limited series of compounds to more elaborate ones that can accommodate a variety of structures.

Following a short introduction, the chemical basis for each method of estimation is developed. Taking into account the application perspective of this book, the theory is not given in a comprehensive format but provides a basis for evaluating methods. Furthermore, a comparison and evaluation of methods and the degree of intercorrelation among the parameters fundamental to each method are also given. Moreover, the sources of solubility and the number of experimental factors that determine the quality of data are also discussed. Finally, a computer programme for Unifac calculations and the solubilities of some superfund extremely hazardous substances are also reported.

The literature coverage is rather complete containing over 300 references until 1990. This book is very useful in a variety of disciplines including pharmacy, environmental sciences, food science, geochemistry, and organic, physical and analytical chemistry.

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RISK ASSESSMENT AND ENVIRONMENTAL FATE METHODOLOGIES by E. J. Calabrese and P. T. Kostecki, (Northeast Regional Public Health Center, University of Massachusetts, USA) 150 pages, Lewis Publishers, Boca Raton, FL, USA (1992), ISBN 0-87371-711-2.

This book provides a review of 11 existing environmental fate models made by the Analysis and Environmental Fate Committee of the Council for the Health and Environmental Safety

of Soils (CHESS), focusing on models which can deal with petroleum hydrocarbons. The models are evaluated on their basis in science, applicability and site specificity; ability to address multiple environmental media, input data requirements, strengths and weaknesses.

Model evaluation was carried out taking into account the usefulness to quantify the behaviour of petroleum and its products in the different existing forms (i.e. residual petroleum or residual saturation, free-floating petroleum, dissolved petroleum and its content in the vapor phase).

The models evaluated are: An Aid for Evaluating the Redevelopment of Industrial Sites (AERIS), GEOTOX (multimedia compartment), Leaking Underground Fuel Tank (LUFT), MYGRT (simulates solute migration in ground water), Personal Computer-Graphical Exposure Modeling System (PCGEMS), PCB on-site spill model (POSSM), Preliminary Pollutant Limit Value (PPLV), pesticide root zone (PRZM), Risk Assistant/Fate Transport (RAFT), Seasonal Soil Compartment Model (SESOIL) and Superfund Human Health Evaluation.

Therefore, this book will support the development of a consensus risk assessment methodology that could be recommended to risk managers in their development of options for addressing environmental contamination.

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FISH: ECOTOXICOLOGY AND ECOPHYSIOLOGY, edited by T. Braunbeck (University of Heidelberg), W. Hanke (University of Karlsruhe) and H. Segner (Umweltforschungszentrum Leipzig), 418 pages, VCH Verlagsgesellschaft, Weinheim, Federal Republic of Germany (1993). ISBN 3-527-30010-4, DM 184.00

The book is a selection of the contributions presented in an international symposium on "Fish in Ecotoxicology and Ecophysiology" held in Heidelberg on September 25–27, 1991. The book, divided in four sections (Ecotoxicology, Environmental Pathology, Ecophysiology and Environmental Endocrinology), covers a wide range of topics, such as biochemical, genetic and cytological biomarkers, ecotoxicological test methods, alternative in vitro bioassays with fish cells, larvae development, ethology and endocrinology.

The wide coverage of disciplines and the integration of field and laboratory studies is the main interest of the volume, and makes the book a useful reference for scientists working in this field. Following this goal, Section I (Ecotoxicology of fish) offers a good approach to Ecotoxicology as an emerging science, presenting contributions in topics as mixed function oxygenases, genetic and cytological biomarkers of pollution, biomonitoring, toxicological test methods and fish cell lines as alternative test systems. Similarly, Sections III and IV (Ecophysiology and Environmental endocrinology) present a good compilation of data on fish larvae development -histological and genetical studies-, acclimation to temperature, nutrition, effects of environmental stressors, ethology and endocrinology. Finally, Section II, which in my opinion would be better located at the end of the book, is devoted

to Pathology and it contributes to give the global vision in the field of fish ecophysiology and ecotoxicology.

In sumary, these Proceedings offer up-to-date descriptions of a wide range of research activities carried out with fish, and toxicologists, physiologists and "pure" ecologists may find the volume a worthwhile record.

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ECOLOGICAL RISK ASSESSMENT, editor and principal author Glenn W. Sutter II (Oak Ridge National Laboratory, USA), 538 pages, Lewis Publishers Inc., Chelsea, MI, USA (1993). ISBN 0-87371-875-5

The text is intended for advanced students in the environmental sciences and for practicing environmental scientists. Although it assumes a basic knowledge of ecology, toxicology, chemistry, mathematics, and statistics, no knowledge or experience in risk assessment is needed.

The book, divided in four sections, is mainly focused on aquatic systems. The first part (chapters 1–3) is an introduction to risk assessment covering concepts, definitions and methods. In the second section (chapters 4–6) methods for estimating the exposure of organisms to chemical pollutants are discussed. Mathematical models to estimate the transport and fate of pollutants as well as the degree of exposure experienced by organisms in the polluted environment are clearly put forward. Physical/chemical properties of pollutants that will determine their behaviour in the environment are also mentioned. The third section deals with Effects Assessment. In this section, the author discuss different methods for estimating the type and magnitude of ecological effects that result from the exposure to pollutants. The discussion of effects is organized hierarchically, the lowest organization level considered being the individual organism (chapter 7), followed by population and ecosystem levels (chapters 8 and 9). Finally, the fourth part, entitled Unconventional Ecological Risk Assessment (chapters 10 to 13), deals with retrospective risk assessment, regional risk assessment, environmental surveillance and there is even a chapter on risk of introduction of exotic organisms in a ecosystem.

In summary, the text is a very good compilation of references, models and approaches and as the author points out in the preface, its expected benefit should be the recognition of ecological risk assessment as a new emerging science that is worthy of support by governmental agencies or private industries and needed of the best efforts of environmental scientists.

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CHEMISTRY OF WATER AND WATER POLLUTION, Edited by Jan R. Dojlido (Institute of Meteorology and Water Management, Poland) and Gerald A. Best (Principal Freshwater Scientist, Clyde River Purification Board, Scotland). 360 pages, Ellis Horwood Series in Water and Wastewater Technology, Ellis Horwood LTD. Market Cross House, Cooper Street, Chichester, West Sussex, PO19 1EB, England. ISBN 0-13-878919-3. $110.50

Some books are best characterized by quoting a few lines of text; this is one of them. When discussing the dioxins, the heading to the section on analysis is "Method of determination (McKinney 1977)". With the phthalate esters, two (out of three) subheadings in the section on analysis are "HPLC method (Schwartz et al. 1979)" and "GC-MS method (Morita et al. 1974)". With the phenols, LC is not even considered as a method. No column chromatographic procedure is mentioned for optical brighteners, and the potential of a mass spectrometer for detection and identification is discussed hardly at all. In the section on pesticides, ten official methods from the UK are quoted; half of these are at least ten years old. Actually, a large proportion of all literature on organic compounds is ten to fifteen years old. The present reviewer is not an expert in the field of inorganic chemistry, but, again, the scarcity of references covering the past decade is striking.

Admittedly, the book contains much basic information concerning the chemistry of water and water pollution. However, the information often is rather superficial with date being presented for a single country, one river basin, or a single year (which may well be 1980) only. Providing interesting background information, presenting a real discussion or arriving at conclusions are goals that are not pursued by the authors. This is a pity because then an added value would have been created and as a logical sequel, interesting guidelines for further study, and research, would have been formulated. Unfortunately, after scrutiny of the present text, the reviewer does not feel that he can recommend purchase of the book.

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PHYSICS, CHEMISTRY AND TECHNOLOGY OF SOLID STATE SENSOR DEVICES, by A. Mandelis (University of Toronto, Ontario, Canada) and C. Christofides (University of Cyprus, Nicosia, Cyprus), 323 pp., John Wiley & Sons, New York, USA. ISBN 0-471-55885-0. £58.00

This publication is volume 125 of the prestigious monograph series on analytical chemistry and its applications that has been published by John Wiley for a number of years, first under the direction of I.M. Kolthoff and currently under J.D. Winefordner. This is the first time that a volume of this series is dedicated to chemical sensory technology. The specific subject being solid-state gas sensors.

Since 1970 there has been a rapid expansion in the field of solid-state gas sensors. However, there are very few specialized books dedicated to discuss the global physical and

chemical principles of these sensors and the associated fabrication technologies. The present monograph fills a need from analytical to electronic engineers interested in the subject.

Chemical sensors (including biosensors) can be seen as a new concept in analytical instrumentation. Ideally, they show very attractive features such as a selective, sensitive, fast and reversible response. Additionally, they are robust, small, easily operated and their fabrication is simple and low in cost. The volume under review shows the state of the art regarding devices manufactured using solid-state technologies. It is the use of these technologies that provide many of the desirable features listed above. There is a particular emphasis placed on the following devices: gas-sensitive solid state semiconductor sensors, photonic and photoacoustic gas sensors, fiber-optic sensors, piezoelectric quartz crystal microbalance sensors, surface acoustic wave devices and pyroelectric and thermal sensors. The book contains more than 700 references on these topics.

Finally, the monograph is a very useful reference for analytical chemists interested in the use of solid-state sensors in environmental applications and also for engineers involved in the study of solid-state devices and willing to unify their knowledge with the technology of chemical sensors of gaseous species.

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