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Book Reviews

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BOOK REVIEWS

Environmental Health. The Impact Of Pollutants. Edited by J. Rose. 455 pages. Environmental Topics, Vol. I. New York, Gordon and Breach, New York, London (1990) US\$ 90.00.

This is the first volume in a series on environmental topics, to be edited by Professor J. Rose. It consists of 33 papers published over the past few years either in *The International Journal of Environmental Studies*, or in *Toxicological and Environmental Chemistry*. The basis of selection is the identification of important and topical subjects in several areas, such as carcinogenicity, genotoxicity, environmentally induced diseases and environmental health problems in developing countries. The range of subjects is wide and the papers are all readable and informative.

An interesting and important paper on the effects of passive smoking and lung cancer argues for the incorporation of suitable laboratory tests into epidemiological studies of this subject, to improve the quantification of exposure. The epidemiological studies which are reviewed (up to 1987) have mostly depended on exposure data from interviews and none have used a biochemical measure of exposure.

The criteria for biochemical assessment of exposure to passive smoking are set out. A sensitive enzyme linked immunosorbent assay for benzo(a) pyrene DNA adducts is described; it appeared to discriminate between smokers of 20+ cigarettes a day and non-smokers.

Aromatic polycyclic hydrocarbons are the subject of several papers. It is pointed out that there is a lack of suitable animal studies on which to base risk estimates. A variety of aspects of polycyclic aromatic hydrocarbons (PAH) is covered: mutagenicity testing (different relationships between PAH and mutagenicity); PAH in surface waters and sediments which are variable in the former and less so in the latter; PAH in food intake; PAH metabolites in the urine of exposed workers; and the detection of exposure to PAH from coal tar products by determination of 1-hydroxypyrene.

From Sri Lanka comes a significant positive correlation between the prevalence of various human cancers (including stomach, small intestine, oesophagus and liver) with nitrate concentration in the atmosphere. A review paper sets out the possible role of N-nitrosamide in suppressing the immune system, and suggests its involvement in viral, bacterial and parasitic infections, AIDS, and in cancer in humans and animals.

Estimates of the risk of lung cancer and mesothelioma due to asbestos in buildings have been made by extrapolation from industrial experience. The quality of quantitative estimates especially for mesothelioma is poor but is the best that can be done at present. The account does not mention the contribution to dust in cities of asbestos fibres from car brake linings.

Radon in dwellings is another matter which is presently receiving great attention. Its geographical distribution, the methods of measuring concentrations and recommended action levels are reviewed in a paper from London.

In describing the mutagenic and carcinogenic effects of cadmium, which is now considered an unlikely cause of prostatic cancer, lung cancer is seen as a possible risk but needs further work to be sure.

In the papers on genotoxicity of Cr, Pb and Hg, phagocytosis of insoluble metal compounds is seen to be important. Another topical issue is the relationship of sites for toxic waste to congenital abnormalities in children born in the same area. Significant effects have been found but there is still a need for longitudinal studies to substantiate them.

There is an interesting review of selected epidemiological studies of the demographic and social factors which might or might not be involved in multiple sclerosis. In contrast a paper on the use of measurements of lead in the teeth of children deals with criticisms of the work on the grounds of measurement errors and bias.

Chirality, the study of molecular asymmetry, which now has its own journal, is given prominence in relation to the neuropathic toxicity of organophosphorus esters. Metabolites of organophosphorus pesticides in urine as an index of absorption, are reliable and sensitive indicators which help in removing from exposure those with excessive excretion which indicates excessive organophosphorus uptake.

A review of trace and ultratrace elements in nutrition, in relation to oncogenesis and toxicology covers zinc, copper, chromium, arsenic, nickel and vanadium. A review of the literature on epidemiological studies of agricultural injuries in Scandinavia and North American follows, and then a paper on hazardous wastes.

In the last group of papers are the contributions from developing countries, which include a discussion of the management of environmental sanitation in Nigeria, urban health hazards in Zambia and non industrial pollution in India. An unusual paper is from West Bengal on the effects of altitude on plasma immunoglobulins and on plasma thyroid stimulating hormone.

As will be seen these papers are very varied and cover an extensive range of topics. It is intended that the book should have a wide appeal and it is aimed at public health workers, politicians, nutritionists, medical personnel, environmentalists and academics of various disciplines. In some subjects which are advancing rapidly some contributions are likely to be rather out of date by now but this is offset by their value as stimulating background reading.

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Hydrocarbon Contaminated Soils And Groundwater. Analysis, Fate, Environmental And Public Health Effects, And Remediation. Edited by *P.T. Kostecki and E.J. Calabrese* (University of Massachusetts at Amherst, USA), 354 pages, Lewis Publishers Inc., Chelsea, MI, USA. (1991). ISBN 0-87371-383-4. US\$ 66.00.

Although a book with a similar title was published by the same authors in 1989, the present one represents a step forward in a comprehensive up-dating of information for both technical

and regulatory issues in the field. While historically soil contamination has received relatively less attention than groundwater contamination, the close relationship between both processes makes the approach presented in this book very appropriate and timely.

The volume assesses the field with respect to identification of various current perspectives on hydrocarbon contamination including state (Chapters 1 and 5), county (Chapter 2), municipal (Chapters 3 and 4), as well as emerging issues such as sharing responsibilities for cleanups (Chapter 6) and the remediation oil field wastes (Chapter 7). Technical assessment of hydrocarbons contaminated soils and groundwater is also provided in the areas of analysis (Chapters 8 and 9) and site assessment (Chapter 10), environmental fate (Chapter 11) and modeling (Chapter 12), remedial technologies (Chapters 13-16), and risk assessment and management (Chapters 17-21).

Most of the references are from 1985 to 1990, reporting recent advances in the field. Thus, the book will serve as a useful source of technical information for scientific researchers, regulatory personnel and environmental consultants.

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Potentiometric Water Analysis. (2nd Edition) by *D. Midgley and K. Torrance*. 600 pages. (Technology and Environmental Centre, Kelvin Av. Leatherhead, Surrey, U.K.) John Wiley, Chichester, West Sussex, U.K. (1991), ISBN 0-4719-2983-2, £ 65.00.

Contents: Part I: Theoretical And Practical Background: Introduction; Electrochemical Principles; Electrodes; Equipment; Analytical Principles; Potentiometric Titrations and Related Methods; Potentiometric Analytical Practice; Part II: Analytical Methods; Appendices.

This is an updated version of the previous successful edition of the same book in 1978. It includes both, theoretical and practical aspects of potentiometry. The first part about the theoretical and practical background is oriented to practical uses of potentiometry and ion selective electrodes more than to electrochemical principles. The second part provides an extensive recopilation of analytical methods and practical usages of the most common techniques used in water analysis using potentiometry. This is a very practical book not only for people working in water analysis but also for anybody working with potentiometry. Owing to the amount of information given in the book, it is also very interesting in academia. This book provides a very good illustration of the potentialities of potentiometry to provide fast, non-destructive and inexpensive measurements in field and in laboratory.

Compared with the first edition, this second edition introduces the use of new ion selective electrodes which became available in the last twelve years, as the residual chlorine electrode, the free hydrogen sulphide electrode, the solid-state mercurous chloride electrode, the barium-selective electrode and the surfactant-selective liquid membrane electrode, all of them very interesting in environmental analysis. A deeper study of the characteristics of the neutral carrier membrane electrodes for sodium, lithium and calcium and an improved treatment of the different techniques used in potentiometric determinations are also included in the present edition. Standard addition methods, flow injection methods and microproces-

sor methodologies are also covered. Special mention should be given to the good selection of the references for each analytical method and also for the fundamental aspects. Environmental applications are stressed.

The book covers the determination of H, Li, Na, K, Rb, Cs, Tl(I), hardness of water, Mg, Ca, Ba, Al, Ag, Cu, complexometric titrations, Cd, Pb, Co₂, SO₂, SO₃⁼, NO₂, nitrogen oxides, NH₃, CN, hydrazine, F, Cl₂, Cl⁻, Br⁻, I⁻, SCN⁻, S⁼, SO₄⁼, MoO₄³⁻, WO₃, NO₃⁻, BF₄⁻, ClO₄⁻, surfactants etc. Each determination is usually given in a complete chapter with the following parts: introduction, apparatus, reagents, sample collection, conditioning and storage of electrodes, concentration range and units, analytical procedures (selected), sources of error (temperature, interferences, storage and contaminations . . .), precision, accuracy, response time, automatic and continuous analysis, applications and faults.

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Chemical Ecotoxicology by *J. Paasivirta (University of Jyväskylä, Finland)*. 210 pages. Lewis Publishers, Inc., Chelsea, MI, USA) (1991). ISBN 0-87371-366-4. US\$ 72.00.

In the early 70's the study of the occurrence, fate and adverse effects of anthropogenic chemicals on the environment and on the inhabiting biota, gave rise to the development of the new science of ecotoxicology. A number of publications resulted from this effort, notably the SCOPE 12 Report, Principles of Ecotoxicology, issued in 1978.

Since then, significant improvements in concepts and methods have been recognized and remarkable advances have been produced on predictive assessments of toxic effects of pollutants on ecosystems. Many of these achievements are presented in this book and illustrated with examples and case studies.

The chapters briefly describe the cycles of the major elements (C,O,S,P and metals) in the environment, review the structure-toxicity relationships of chemicals, and give an overview on the sampling and analysis of trace organics and on the environmental fate of mercury, organohalogen compounds, chlorobleaching effluents from forest industry and oil residues.

The content is mainly based on the extensive scientific production of the author and, therefore, it should not be considered as a comprehensive introduction to ecotoxicology as the one referred above, but as a basic presentation of some modern aspects of the field. Consequently, the book is particularly suitable for biologists, chemists or engineers which like to be introduced into this science and as a text-book for graduate or undergraduate courses on this field.

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Genetic Toxicology Of Complex Mixtures, Edited by *D. Waters (U.S. Environmental Protection Agency, Research Triangle Park, North Carolina)*, *F. B. Daniel (U.S. Environ-*

mental Protection Agency Cincinnati, Ohio), J. Lewtas, M. M. Moore and S. Nemow (U.S. Environmental Protection Agency Research Triangle Park, North Carolina), 375 pages. Environmental Science Research, vol. 39, Plenum Press, New York (1989). ISBN 0-306-43683-3. US\$ 89.50.

These are the Proceedings of the International Conference on the "Genetic Toxicology of complex mixtures", held from July 4–7, 1989, in Washington, D.C. This book emphasizes the characterization of organic genotoxicants and their mutagenic/carcinogenic effects in complex mixtures of contaminants in air (12 articles), and water (5 articles) and the assessment of exposure and cancer risk (9 articles) by merging biomonitoring and chemical analysis.

Analytical techniques for the characterization of genotoxicants at molecular level in complex mixtures are overviewed. The contribution of indoor and outdoor sources of pollution to the atmospheric genotoxicity and the role of the atmospheric transformations to the variability of mutagenicity are presented. The significance of nitroarenes and polycyclic aromatic hydrocarbons as mutagenicity/carcinogenicity contributors in outdoor and indoor environments is emphasized. Furthermore, the formation of mutagens during different disinfection procedures of drinking water (i.e. chlorination, ozonolysis) and the methods for the detection of genotoxicants in wastewaters are presented. DNA-adduct formation and its postlabeling assays are discussed.

Finally, new developments for assessing the risk of complex mixtures in the environment and methodologies for evaluating the cancer risk from the occupational exposure are also presented. The book is probably the most comprehensive overview on the topic and contains many ideas for further research.

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Nitroarenes, Occurrence, Metabolism, And Biological Impact, edited by P.C. Howard (*Case Western Reserve University, Cleveland, OH*), S. S. Hecht (*American Health Foundation, Valhalla, NY*), and F. A. Beland (*National Center for Toxicological Research, Jefferson, AK*). 333 pages, Environmental Science Research Series, Vol. 40, Plenum Press, New York (1990). ISBN 0-306-43694-9, US\$ 79.50.

The book contains 28 papers presented at the Fourth International Conference on "N-Substituted Aryl Compounds: Occurrence, Metabolism and Biological Impact of Nitroarenes", held in July 15–19, 1989, in Cleveland, (OH, USA). A multidisciplinary overview of the carcinogenesis, metabolism and chemistry of nitroarenes and aromatic amines is nicely presented. The carcinogenesis of inhaled diesel exhausts and the induction mechanisms in laboratory animals are also given. Retention models for the unusual behaviour of the alveolar clearance in rats, which may be applicable to other mammals are outlined. A great deal of interest is focused on the RNA-, DNA-adduct formation with aromatic amines, nitroarene

oxides and epoxides. Mass spectrometric techniques for the identification of nitroarene-DNA adducts are also presented. Furthermore, the role of bioassay-directed chemical analysis in air particulate matter and the state-of-the-art of the atmospheric reactions which leads to the formation of nitroarenes and nitrohydroxy derivatives are overviewed.

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Chemometrics: experimental Design, by *E.D. Morgan*. (*The Polytechnic of Wales, U.K.*), 275 pages, John Wiley, Chichester, U.K. (1991) ISBN 0-471-92903-4. US\$ 57.50.

This introductory book to the experimental design belongs to the series on Analytical Chemistry by Open Learning and provides a comprehensive and integrated coverage of the subject. The learning objectives are constantly challenged by self-assessment questions with remedial responses, which is an effective methodology to assimilate the topic.

Following an introductory review of the statistical methods used in experimental design, the fundamental areas (i.e. randomization, replication and blocking) and designs of increased degrees of complexity are introduced. Moreover, the fractional factorial designs and the response surface methodology are clearly presented. A comprehensive review to the meaning of the output of software packages used to set up and analyse the results of the experiments is also presented. Finally, the criteria to decide which of the many available designs are more suitable for the most efficiently mapping of response surfaces (i.e. contour diagrams, 3-D response surface plots) are discussed.

In conclusion, this book will be particularly valuable to those requiring a practical introduction to experimental design with emphasis on the methodology and applications.

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Multimedia Environmental Models. The Fugacity Approach, by *D. Mackay* (*Department of Chemical Engineering and Applied Chemistry, University of Toronto, Canada*), 257 pages, including 11 computer programs in diskette. Toxicology and Environmental Health Series, Lewis Publ., Chelsea, Michigan, U.S.A. (1991). ISBN 0-87371-242-0. US\$ 59.95.

This book is a broad overview on the modeling of the behaviour of chemicals in the environment, including the relationships between biotic and abiotic compartments. The distribution of organic contaminants among multimedia (4 or 8 compartments) are modeled in terms of the fugacity approach and mass balance calculations. Three levels of calculation are considered, taking into account different environmental situations (i.e. equilibrium, non equilibrium, steady-unsteady state, etc.). The application of this approach to intermedia transport is also developed, particularly, using dual compartment exchange models (i.e.

air-water, surface soil, sediment-water, fish-water). Integrated models to predict the fate of chemicals in lakes and ponds (i.e. Quantitative Water Air sediment Interaction-QWASI) and in indoor environments are demonstrated. Furthermore, other applications such as the determination of the exposure of chemicals in risk assessment studies and different aspects of quantitative structure activity relationships (QSARs) are briefly discussed.

The excellent presentation given in this book, starting from fundamental aspects to the worked examples will be of interest to everybody involved in the assessment of the fate of organic contaminants in the environment (environmental regulatory agencies, industry and private consulting). The book provides a series of computer programs which can be easily executed and modified according to the area of study and its characteristics.

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