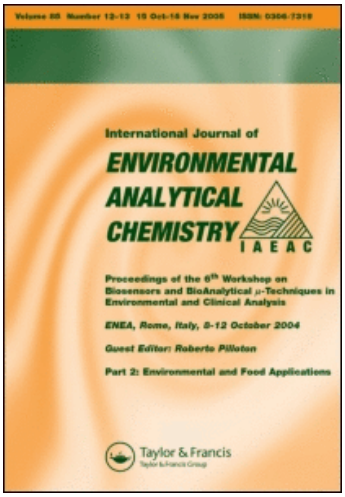

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Book Reviews

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BOOK REVIEWS

ANALYSES OF HAZARDOUS SUBSTANCES IN AIR, Volume 1, edited by Antonius Kettrup (GSF, D-W-8042 Neuherberg FRG) and Jürgen Angerer (D-W-8520 Erlangen FRG), 223 pages (including 38 pictures, 11 tables, 3 pages with addresses of the experts of the working subgroup, but unfortunately no index), hard cover, format 244 × 176 mm, ISBN 3–527–27015–9, DFG Deutsche Forschungsgemeinschaft, VCH-Verlagsgesellschaft mbH, D-W-6940 Weinheim (1991), DM 98.—

The editors have preferred methods for the representative determination of exposure profiles: too simple, too cheap, and less time-consuming methods may lead to errors and/or to misinterpretations, and are in summary more expensive. The described techniques thus satisfy the requirements of statistical quality control. The important role played by atomic absorption spectrometry, as well as by gas and high performance liquid chromatography comes through clearly. The investigating commission does want to make these German contributions to ambient and biological monitoring available in English to an international audience. The important volume begins with an introduction, theoretical principles of diffusion sampling and evolution of analytical methods and results. For concentrating and sampling absorption, condensation and adsorption in diffusion and permeation samplers are discussed, including influences of ambient parameters. Besides infrared spectrophotometric determination of gases and vapors using long-path gas cuvettes, specific analytical methods for eleven organic compounds and for airborne lead, nickel, cobalt and chromium are described. In the latter four cases flameless atomic absorption spectrometry is used for the determination of dust contents, but speciation is not considered by the authors. Calculation of the analytical results and reliability of the methods are discussed in detail.

TERRESTRIAL BEHAVIOR OF PESTICIDES, CHEMISTRY OF PLANT PROTECTION 8, edited by W. Ebing et al. (Biological Federal Institute for Agriculture and Forestry, D-W-1000 Berlin 33, Federal Republic of Germany), 144 pages (including 31 figures, 27 tables, references added to the contribution, and a subject index of seven pages), hard cover, format 242 × 161 mm, ISBN 3–540–54238–8, Springer-Verlag, Berlin, Heidelberg, New York, London, Paris, Tokyo, Hong Kong (1992), DM 158.—

The series publishes invited, reviewed critical reviews on plant protection, pest control, ecotoxicological behavior, properties of pesticides, residue analysis, and toxicity testing. It is thought to be of interest to graduate students, research fellows and practicing scientists. The present volume contains four contributions by I. Scheunert (GSF-Institute for Soil Ecology, D-W-8042 Neuherberg FRG) and by H. Parlar (University of D-W-3500 Kassel FRG). They discuss physico-chemical processes related to pesticide behavior in terrestrial ecosystems and transformation, degradation and fates of pesticides. Due to interactions with

environmental parameters and with other pesticides present, data on mobility may be hard to interpret. It continues to be difficult to extrapolate laboratory observations to field situations. I. Scheunert identified for instance 28 degradation products of pentachloronitrobenzene after hydrolysis in a leachate after 8 ½ years of application. It seems that the nitrogroup is first eliminated. She discussed in detail oxidative, reductive, hydrolytic and biotic processes, secondary reactions, interactions, mineralization, and long-term fates of pesticides or organic (aromatic) intermediates. Interesting are transformations (e.g. of DDT and Lindane) in soil-fauna, such as earthworms. H. Parlar studies mechanisms for the behavior of pesticides on surfaces. At the interface between the solid and the gaseous phase pesticides undergo complex reactions induced by solar radiation and catalysed by trace substances. The author is describing such reactions and the different kinds of equilibria. For instance incorporated cations affect adsorption by humic acids. It decreases particularly in the presence of protons and aluminum and iron ions. He discusses particularly photophysics, photodegradability relationships, and the effectiveness of pesticides and their photoproducts under laboratory and natural conditions.

ECOTOXICITY OF CHEMICALS TO AMPHIBIANS, Volume One, edited by James Devillers, (Centre de Traitement de l'Information Scientifique, Lyon) and by J. M. Exbrayat (Catholic University, Lyon, France), 351 pages (no figures, no tables, but includes a taxonomical guide of 11 pages on 14 frogs (Anura), 5 salamanders (Urodella), and 9 toads (Anura), a glossary of 4 pages, a bibliography of 3 pages, but unfortunately no subject index (just contents only)), hard cover, format 255 × 176 mm, ISBN 2–88124–872–1, Gordon and Breach Science Publishers, Philadelphia, Reading, Paris, Montreux, Tokyo, Melbourne.

The volume contains a detailed review of toxicological results of 322 inorganic and organic chemicals (arranged alphabetically), including both laboratory and field experiments. The very valuable, well presented summary tables include the experimental conditions and all the information required to analyze the toxicity results. In fact it is very useful that the informations are always structured in the same comparable way, and it is easy to understand how the amphibians were tested and what the presented effects mean. Of course also the original reference is mentioned in each case. But most informations are based on mortality studies only, which should be expanded to other observations. For some chemical exposures mortality informations alone make of course little sense. It seems also that the informations are sometimes out-dated and selected somewhat arbitrarily. For instance the interesting results on teratological effects of cadmium and nickel compounds by F. William Sunderman Jr. are not even mentioned. But as a basis for further investigations and for finding worldwide experts, the book can be recommended, whereas interpretations of shown data should be made carefully.

HAZARDOUS METALS IN THE ENVIRONMENT, TECHNIQUES AND INSTRUMENTATION IN ANALYTICAL CHEMISTRY 12, by Markus Stoeppler (Research Center, D-W-5170 Jülich), 541 pages (including 34 figures, 68 tables, and a well structured subject index with 78 headings and many sub-headings (keywords) on seven pages), hard cover, format 246 × 170 mm, ISBN 0–444–89078–5, Elsevier Science Publishers B.V., Amsterdam, London, New York, Tokyo (1992), US$ 225.50, Dfl. 395.—

The editor and 17 other experts are reviewing in an excellent way achievements in

analytical chemistry of metal species and in optimizing methodology, particularly in the last two decades. They identified problem areas and tackled critically research strategies, environmental levels and techniques. For analytical chemists and those dealing with analytical data it is a must to get this book. The tests and the many references serve in fact as a valuable aid for the many researchers involved in trace metal analysis in environmental and biological materials, in selecting the most promising method for a certain element in a certain matrix. The recommended volume is structured after the introduction in principle into four parts:

—Sampling, Sample Treatments and Sample Preservation,

—Analytical Methods: Instrumentation, Chemical Speciation,

—Elemental Analysis in Environmental and Biological Materials with Concrete Information on Aluminum, Arsenic, Cadmium, Chromium, Cobalt, Lead, Mercury, Nickel, Selenium and Thallium Species,

—Quality Assurance and Validation.

The presented knowledge allows the necessary execution of detailed studies on the fate and levels of hazardous elements, and their chemical and organometallic species, in the environment, foodstuffs and living organisms. Ranges of the application of methods and known environmental and biological levels are critically reviewed. Particular attention is also given to specimen banking and reference materials.

REVIEWS OF ENVIRONMENTAL CONTAMINATION AND TOXICOLOGY, Volume 121 with three contributions, edited by George W. Ware (College of Agriculture, University of Arizona 85721, Tucson, U.S.A.) and a Board, 161 pages (including 4 figures, 36 tables, and an index of about four pages), hard cover, format 241 × 160 mm, ISBN 3–540–97644–2, Springer-Verlag, Berlin, Heidelberg, New York, London, Paris, Tokyo, Hong Kong (1991), DM 98.—

The series contains contributions concerned with aspects of chemical contaminants in the total environment with toxicological considerations and consequences. The reviews lie in the domains of analytical chemistry, and its methodology, biochemistry, human and animal medicine, legislation, pharmacology, physiology, regulation, and toxicology. In this volume three chapters (with added references) are included:

—P. M. Outridge, et al. (University of Toronto, Ontario M5S 3B2, Canada) deals with "Accumulation of Toxic Trace Elements by Freshwater Vascular Plants",

—Klaus J. Lendzian, et al. (Technical University of D-W-8000 Munich 2 FRG) with "Sorption and Transport of Gases and Vapors in Plant Cuticles", and

—G. A. O'Connor, et al. (New Mexico State University, Las Cruces, NM 88003, U.S.A.) with "Bioavailability to Plants of Sludge-Borne Toxic Organics".

The first contribution summarizes contents of a variety of submergent and other fresh water vascular plants of 15 trace elements. Manganese accumulates in leaves and stems, the other metal species in roots, often depending on sediment properties. The mentioned plants play an important role in the seasonal metal cycling. Particularly silver, arsenic, chromium, copper, mercury, and nickel species are phytotoxic. Chronic effects, for instance of copper ions, are observed already at concentrations of 50–150 μg/L. But the studied plants may be about 100 times less sensitive than phytoplankton. Macrophytes are of interest in wastewater treatment systems.

In the second chapter, interactions with plant cuticles are described quantitatively, using permeance, diffusion, and partition coefficients. The transfer of gas molecules across membranes is mainly determined by intracuticular lipids, but ozone does not enter cuticles, being decomposed. Partition coefficients of NO_2 are on the other side high. One thus observes dualistic behaviors. The authors discuss also permeance and sorption of benzene and other organic vapors. Plant cuticles are sorption compartments for them. A special subchapter is devoted to the analytes of permeance and sorption.

The last contribution discusses the neglible bioavailability to plants of sludge-borne priority pollutants (TOs), determined by excellent analytical techniques in field studies. Volatile TOs are however not easily lost from sludges during processing. Aromatic surfactants are present in sludges in relatively high concentrations. Their plant metabolism is relatively slow. On the other side benzene and toluene (not mentioned in the index)!) are also retained in sludge, but do not persist long enough to represent an agricultural problem (plant bioconcentration factors for chlorinated benzenes were compared).

SOIL ACIDITY, edited by Bernhard Ulrich and Malcolm E. Sumner (University of D-W-3400 Göttingen and University of Georgia 30602, Athens), 224 pages (including 76 figures and 32 tables, references added to the contributions, and an index of six pages), linen, format 242 × 161 mm, ISBN 3–540–50782–5, Springer-Verlag, Berlin, Heidelberg, New York, London, Paris, Tokyo, Hong Kong (1990), DM 138.—

The well presented volume is structured into nine chapters with introductions, and some with conclusions:

—Soil Acidification and Alkalinization,

—Proton Sinks in Soil Controlling Soil Acidification,

—An Ecosystem Approach in Soil Acidification,

—Influence of the Acid / Base Status on the Formation and Interactions of Acids and Bases in Soils,

—The Chemistry of Aluminum, Iron and Manganese Oxides in Acid Soils,

—Assessing the Solubilities and Reaction Kinetics of Aluminous Minerals in Soils,

—Nutrient Status and Toxicity Problems in Acid Soils,

—Effects of Soil Acidity on Plant Associations, and

—The Transfer of Acidity from Soils to Surface Waters.

The chemistry of organic matter and the oxides of aluminum, iron, and manganese are thus treated in the context of being sources and sinks for acid loads in soils. Special attention is payed to the assessment of solubility and reaction kinetics of aluminous minerals. The formation of toxic elements in soil solution resulting from the solubilization of inorganic oxides as well as aspects of changes in the nutrient status of soils, changes of fertility and processes leading to a transfer of acidity from soils to surface are discussed. Accordingly one finds in the index for instance the descriptors Al^{+++}, Al/Ca antagonism, Al buffer, Al cation exchange, Al concentration, Al damage, Al dissolution, Al fluoride complexes, Al hydroxides, Al hydroxy-cations, Al hydroxo-sulfates, Al ion species, Al mobilization, Al oxyhydroxides, Sl saturation, Al silicate, Al solubility, Al sulfate, Al tolerance, and Al toxicity. Interactions and effects are discussed in detail, but one does not find information on analytical chemistry (and on how the presented significant data have been obtained).

ON THE PRODUCTION OF POLLUTANTS DURING COMBUSTION OF WOOD AND WOODEN COMPOSITE BOARDS (in German), by Rainer Marutzky (Technical University of D-W-3300 Braunschweig), 247 pages (including 98 figures, 49 tables, references on 18 pages, an appendix of 16 pages on furnaces, but no index), paper board, format 210 × 149 mm, no ISBN number, Wilhelm Klauditz-Report Nr. 26, Dr. T. Stephen, 8 Lewis Cloke, Risinghurst, Headington, Oxford OX3 8JD, U.K. (1991), DM 55.—

The habilitation thesis describes the results of two German research projects on the emissions of small combustion installation for wood, peat, and vegetable garbage, and on the emissions after combustion of plastics containing wooden materials. The results were obtained in the Wilhelm Klauditz-Institute (WKI) of the Frauenhofer working group for wood research. The booklet is structured after an introduction and information on the execution of the studies, and before a summary, conclusions and the list of references into nine chapters:

—Composition of Wood and Wooden Composite Boards,
—Bases of Thermic Decomposition and Combustion of Wood,
—Combustion Behavior of Wood,
—Combustion Behavior of Wooden Composite Boards,
—Thermic Decomposition of Wood and Wooden Composite Boards,
—Combustion Products of Wood and Wooden Composite Boards,
—Heterogenic Chemical Reactions in Glowing Embers (Burning Out),
—Emissions of Solid Particles and Ashes, and
—Reduction of Emissions.

Regarding analytical chemistry the used gas-chromatographic techniques and the detection, for instance by flame ionisation (FID) or mass spectrometry (MSD) are described. If the combustion is incomplete (particularly in the case of coated materials) nitrogen and/or chlorine containing compounds have to be monitored. The author has analysed the emissions for instance for ammonia, hydrogen cyanide, chloro-methane, chloro-benzene, and poly-chlorinated dibenzo-p-dioxins, but also for hydrochloric acid. After incomplete combustion on a grate he found 111 ng $T_4CDF's/m^3$, 25 ng $T_4CDD's/m^3$, 33 ng $P_5CDF's/m^3$, and 23 ng $P_5CDD's/m^3$ in the flue gas (the concentrations of the higher chlorinated compounds were much lower).

METABOLISM OF THE ANTHROPOSPHERE, by Peter Baccini (EAWAG, CH-8600 Dübendorf, Switzerland) and Paul H. Brunner (Technische Universität A-1040 Vienna, Austria), 157 pages (including 55 figures, 66 tables, and a subject index of 3 pages) paper board, format 235 × 156 mm, ISBN 3–540–53778–3, Springer-Verlag, Berlin, Heidelberg, New York, London, Paris, Tokyo, Hong Kong, Barcelona, Budapest (1991), DM 98.—

The tool for a new multidisciplinary workshop on "kybernetics of the anthroposhere" consists after the introduction and before a summary in the three chapters

—The Anthroposphere,
—Methodology of the Analysis of Material Fluxes, and
—The Metabolism of a Region.

The authors tried to present the background in answering two questions: how much time is left to efficiently reduce existing man-made hazardous impacts on our essential resources, on water, air and soils? what should be done in first priority to prevent hazardous anthropo-

genic material fluxes with respect to man and the biosphere? To understand regional economics (and to characterize man's activity)—besides capital and labor—the essential material fluxes entering and passing through the atmosphere have to be considered. The authors discuss also the analogies of the knowledge of the dynamics of goods and processes in the environment to medicine as a "synthetic science". In both fields prophylaxis should be more important than therapy. "Metabolic studies of the anthroposphere" as a new branch may help to answer crucial questions, such as "what do we have to measure, where and how should we measure?". Practical cases, such as cycling and the partitioning of chlorine, cadmium and iron are analysed. Composition of wastes, their storage, transport, and disposal are also evaluated quantitatively.

GAS CHROMATOGRAPHY IN AIR POLLUTION ANALYSIS, by Viktor G. Berezkin and Yuri S. Drugov (Russian Academy of Science) and A. V. Topchiev (Institute for Petrochemical Synthesis, Moscow), 211 pages (including 74 figures, 62 tables, rather old (up to about 1984) references added to the chapters, an incomplete index of three pages), hard cover, format 245 × 171 mm, ISBN 0–444–98732–0, Journal of Chromatography Library Volume 49, Elsevier Science Publishers, Amsterdam, Oxford, New York, Tokyo (1991), US$ 140.-, Dfl. 245.—

The book was written to describe methods of detecting pollution of the atmosphere and the air in industrial areas. The readers get some ideas on Russian approaches (including philosophies on threshold limits and allowable concentrations of harmful substances in the air of working zones) and suggestions on single and crucial phases of the development of chromatography. The volume is structured besides the introduction and conclusions into seven chapters:

—Air as an Object of Analysis,
—Gas Chromatography in the Analysis of Air Pollution,
—Detectors for the Gas Chromatographic Determination of Impurities,
—Collection and Pretreatment of Samples for Chromatographic Analysis,
—The Reactive-Sorption Method and Its Application for Concentrating Pollutants,
—Quantitative Methods for the Determination of Impurities, and
—Practical Application of Gas Chromatography to the Determination of Air Pollutants.

The specialist may find interesting technical details and data, and may get access to Russian literature.

ISOTOPES IN THE PHYSICAL AND BIOMEDICAL SCIENCES, Volume 2 on ISOTOPIC APPLICATIONS IN NMR STUDIES, edited by E Buncel and John Richards Jones, Queen's University, Kingston, Ontario, Canada and University of Guildford, England, 488 pages (including 120 figures, 65 tables, many schemes and formulae, references added to the chapters, and a good subject index of 14 pages), hard cover, ISBN 0–444–89090–4, Elsecier Science Publishers, Amsterdam, Oxford, New York, Tokyo (1991), US$ 274.50, Dfl. 480.—

Since the first volume of the series handled methods of labelling and some specific groups of labelled compounds, this excellent second monography is an independent volume of great interest to analytical chemists and to instrument producers. It is structured into the nine chapters:

—The Dynamic and Electronic Factors in Isotope Effects on NMR Parameters,
—^{3}H NMR Studies of Hydrogen Isotope Exchange Reactions,
—Deuterium Nuclear Magnetic Resonance Spectroscopy in Partially Ordered Systems,
—Alkali Metal NMR Studies of Synthetic and Natural Ionophore Complexes,
—Multinuclear and Multipulse NMR of Organosilicon Compounds,
—One-bound ^{13}C-^{13}C Coupling Constants in Structural Studies,
—NMR of ^{6}Li-enriched Organolithium Compounds,
—NMR as a quantitative Analytical Tool in Chemical Applications of Isotopes, and
—Application of Stable Isotope Labelling and Multinuclear NMR to Biosynthetic Studies.

In the two last chapters, the authors stress for instance the simplicity of the technique, since little sample preparation is needed and calibrations are not usually necessary. NMR is non-destructive, and one gets besides the quantitation information on the chemical environment. ^{13}C, ^{15}N, ^{18}O, ^{2}H and ^{3}H labelling provides information on the origins of carbon skeletons of metabolites and also on the origins and fates of oxygen, nitrogen and hydrogen, for instance in metabolic studies.

NICKEL, IPCS Environmental Criteria 108, worked out by a WHO Task Group under the Chairmanship of T. Norseth (National Institute of Occupational Health, N-0033 Oslo), 383 pages (including 3 figures, 36 tables, 66 pages of references up to about 1988, besides the extended English text a French summary of 14 pages and a Spanish summary of 13 pages, but unfortunately no index, which makes it not easy for those looking for informations, also since the list of contents is overlapping), paper back, format 210 × 139 mm, ISBN 924–157108–X, World Health Organization, CH-1211 Geneva 27 (1991), SFr. 38.—

The important basis document is well balanced, written and presented, and must be on the working tables of every environmental chemist, biochemist, occupational hygienist, toxicologist, and administrator dealing with nickel, its ions and its compounds. One may object that the important nickel experts such as A. Andersen, J. M. Benson, C. Bozek, M. Costa, G. M. Courtin, R. P. Hausinger, Th. C. Hutchinson, S. Langård, T. Menné, D. C. F. Muir, S. Rokita, F. E. Rossetto, B. Sarkar, F. W. Sunderman, Jr., D. M. Templeton, and J. Stuart have not been Members of the WHO Task Group, but probably thanks to T. Norseth the health criteria is almost complete and well balanced. It is suggested that in a new edition the newer informations from the International Conferences on Nickel and from the International IAEAC Workshops on Carcinogenic and Mutagenic Metal Compounds resp. on Toxic Metal Compounds in Environment and Life (Interrelation between Chemistry and Biology), as well as informations on antidotes should also be included. The present Health Criteria is structured besides the summaries and the conclusions into nine chapters:

—Identity, Physical and Chemical Properties, Analytical Methods,
—Sources of Human and Environmental Exposure,
—Environmental Transport, Distribution, and Transformation,
—Environmental Levels and Human Exposure,
—Kinetics and Metabolism,
—Effects on Organisms in the Environment,
—Effects on Experimental Animals and in-vitro and other Test Systems,
—Effects on Human Beings, and
—Evaluation of Human Health Risks and Effects on the Environment.

Besides W.H.O. has published in 1991 Health and Safety Guide No. 62 "NICKEL, NICKEL CARBONYL, AND SOME NICKEL COMPOUNDS: HEALTH AND SAFETY GUIDE", a short version at the price of SFR. 5.- with 46 pages. This version contains also current regulations, guidelines and standards in various countries and in the European Economic Community.

THE HANDBOOK OF ENVIRONMENTAL CHEMISTRY, Volume 2 (Part F), Volume 3 (Part F) and Volume 4 (Part C), edited by Otto Hutzinger (Chair of Ecological Chemistry and Geochemistry, University of D-W-8580 Bayreuth FRG), hard cover, format 248 × 170 mm, Springer-Verlag, Berlin, Heidelberg, New York, London, Paris, Tokyo, Hong Kong, Barcelona (1991/92).

We have already earlier informed on this excellent hand-book series (see for instance Intern. J. Environ. Anal. Chem. **15**, 319/320 (1983); **19**, 244/246 (1985); **23**, 158/160 (1985); **27**, 343/345 (1986); **36**, 191/192 (1989); and **44** 140/141 (1991); or Toxicol. Environm. Chem. **30**, 112/113 (1991), to which now five other additions have been published:

Volume 2 (Reactions and Processes, Part F) contains 255 pages (including 57 figures, 34 tables, references added to each contribution, and a subject index of three pages), ISBN 3–540–54139–X, DM 178.—

The book contains four contributions on measurement techniques for wet deposition (discussing mainly North-american programs and quality control), on transport of contaminants by colloid-mediated processes (looking also at colloid-metal interactions, e.g. sorption of cadmium onto hydrous ferric oxide), on chemodynamic models for transport of contaminants from sediment beds (distinguishing between passive and active processes, including bioturbation-induced transport), and photochemically generated reactive oxygen species in the environment (which play a role during degradation of organic pollutants).

Volume 3 (Anthropogenic Compounds, Part F) contains 403 pages (including 48 figures, 116 tables, references added to each contribution, and a subject index of five pages), ISBN 3–540–53797–X, DM 248.—

This book handles detergents, particularly raw materials for laundry detergents, and has been elaborated by a guest-editor (N. T. Oude). It consists of fifteen contributions on surfactants and additives to detergents (including their environmental chemistry, fates and effects). Detergent products differ between Europe and North-america due to differences in washing conditions. Detergent formulation vary also depending on needs, e.g. in cleaning the body, fabrics (in contact with the body), eating utensils, esthetics, cleansing, etc.

Volume 4 (Air Pollution, Part C) contains 185 pages (including 46 figures, 10 tables, references added to each contribution, and a subject index of three pages), ISBN 2–540–53999–9, DM 152.—

T. H. Nash III and C. Gries have written a very good review on lichens as indicators of air pollution, discussing also metal interactions, but important European studies, such as those by M. A. S. Burton, M. De Bruin, R. Herzig, and J. Hertz, have not been discussed. Two other contributions deal with morbidity associated with air pollution, and with mortality and air pollution, looking mainly at ozone, SO_2, and particulates.

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