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### book reviews

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## BOOK REVIEWS

**Acidic Precipitation**, 5 Volumes, edited by Domy C. Adriano, Aiken, South Carolina 29801; Steven E. Lindberg, Oak Ridge, Tennessee 37831; Stephen A. Norton, Orono, Maine 04469; Willem Salomons, NL-9750 RA Haren; et al., Springer-Verlag New York Berlin Heidelberg London Paris Tokyo Hong Kong (1989/1990).

International experts from the United States, Canada, Western Europe, and other industrialized countries have contributed to this subseries of "Advances in Environmental Science", covering relationships among emissions, deposition, and biological and ecological effects of acidic constituents. The five volumes offer a comprehensive overview of the environmental chemistry and the transport phenomena of air pollutants, biological and ecological effects of acidic precipitation, mitigation of acidified aquatic ecosystems, and modeling approaches.

Volume 1 "Case Studies", 311 pages ISBN 0-387-96929-2, DM 228.00, covers long-term studies of the stability and resilience of ecosystem components subjected to different forms of acidic deposition in the United States, Germany, Norway and Scotland. Included are the effects on soil chemistry, soil solution chemistry, slower litter decomposition, aquatic chemistry, forest productivity, and fish populations. A whole chapter is devoted to the comparative biogeochemistry of aluminum.

Volume 2 "Biological and Ecological Effects", 368 pages, ISBN 0-387-97000-2, DM 338.00, includes chapters on (forest) soil productivity, specific effects on soil microorganisms, trees, and crops, and on the mobility and phytotoxicity of aluminum in acidic soils. Perspectives of the biology of aluminum stressed plants are discussed, as well as effects of acidic precipitation on forest ecosystems in North America and Europe. Key soil processes are again litter decomposition, depletion of essential plant nutrients in soil profiles, and responses of limnological ecosystems to acidic perturbation.

Volume 3 "Sources, Deposition, and Canopy Interactions", 332 pages, ISBN 0-387-97015-0, DM 268.00, emphasizes the atmospheric aspects of acidic precipitation. It progresses from discussions of emissions to the atmosphere of compounds derived from both natural and man-made sources to descriptions of the processes controlling their eventual deposition to environmental surfaces. Of special interest are the interactions of acidic and basic airborne substances in the atmosphere and with rain droplets, their reactions with other airborne constituents such as aluminum and other metals, the use of metals as tracers of sources of the precursors of acidic precipitation and of historical deposition rates, the processes controlling the removal of airborne material as dry deposition and deposition interactions with the forest canopy, and past and future trends in atmospheric emissions and options for their

abatement. National acidic precipitation assessment programs are described to reach a consensus on the role that atmospheric emissions play in the environment.

Volume 4 "Soils, Aquatic Processes, and Lake Acidification", 293 pages, ISBN 0-387-97026-6, DM 238.00, emphasizes acid-neutralizing processes and the capacity of terrestrial and aquatic systems to assimilate acidifying substances and, conversely, the ability of systems to recover after acid loading diminishes. The authors focus for instance on interactive processes with soils (including buffering), on the origin of acid sulfate podsol soils from drainage and oxidation of peats that have stored reduced sulfur, on the determination of aluminum speciation in natural waters (and its impact on toxicity to aquatic organisms and terrestrial plants), on snowpack chemistries for both strong acid and trace metal contents (including influences on snowmelting), on the role of sediments in neutralizing via cation release and sulfur reduction, on the use of liming, and on the chemical and biological recovery of lakes.

Volume 5 "International Overview and Assessment", 344 pages, ISBN 0-387-97111-4, DM 298.00, concludes the subseries with a survey of twelve European, Japanese and Canadian national research programs, illustrating various approaches to the problem of better understanding of mechanisms and effects of acidic precipitation.

**Aerosols: Science, Industry, Health and Environment, Volume I and II**, edited by Senichi Masuda, Fukui and Kanji Takahashi, Kyoto, Japan, 1348 pages (including a subject index of 8 pages, which is not too helpful), ISBN 0-08-037524-3, Pergamon Press, Oxford OX3 0BW, U.K. (1990), £164.50, US\$ 330.00.

Pergamon Press, Oxford OX3 0BW, U.K. (1990), 164.50, US\$ 330.00.

The two volumes consist of the Proceedings of the 3rd International Aerosol Conference of September 1990 in Kyoto, Japan. 320 contributions in 15 sections stimulate new and important research interests:

- Plenary Lectures (one on aerosols and climate),
- Session Lectures (e.g. on microcontamination measurement, on background aerosol measurement, on aerosol filtration and separation, on acid deposition, on aerosol rate processes, on heterogeneous nucleation, and on aerosol exposure),
- Nucleation/Growth,
- Generation,
- Optical Properties,
- Dynamics,
- Measurement (e.g. fiber monitoring, e.g. related to asbestos), condensation particle counting, particle characterization in combustion exhaust, aerosol spectroscopy, aerosol size distribution, personal sampling systems, and remote detection),
- Filtration/Sampling (using also diffusion deposition),
- Contamination Control (including precipitation),

- Indoor Air Quality (including radon progeny measurement),
- Industrial Process/Application
- Air Pollution (including hydrocarbon and metal determination),
- Global Climatology,
- Nuclear Aerosols (from nuclear power plants, radon, etc.), and
- Health Effects/ Clinical Application (particularly inhalation).

**Analytical Instrumentation Handbook**, edited by Galen Wood Ewing, New Mexico Highlands University, Las Vegas, New Mexico, U.S.A., 1071 pages, ISBN 0-8247-8184-8, Marcel Dekker, Inc., New York, U.S.A. and Basle, Switzerland (1990), US\$ 195.00 in the U.S.A. and Canada), and US\$ 234.00 in other countries.

The 33 American, British, Canadian, Polish, and Japanese experts have contributed to 27 excellent overviews in five parts:

- The Use of Computers in the Laboratory,
- Spectrochemical Instrumentation,
- Electrochemical Instrumentation,
- Chromatographic Methods (practically nothing on ion chromatography), and
- Miscellaneous Methods.

Sample Handling is practically only discussed in context with infrared spectroscopy and flow analysis. Little information is found on reference materials and standards, and not too much on data handling and interpretation (the descriptor “error” is only mentioned for infrared spectroscopy). But otherwise analytical chemists, biologists, and other scientists find almost everything on pros and cons of different types of analytical instruments. The book helps to select the right approach and the best instruments to solve specific problems, and to inform about options within each domain. Block diagrams of instruments are appropriate in fields where most of the instruments in use have been assembled by the user. A checklist of questions in the introduction assists in making intelligent choices of instruments to purchase. Also priorities between high speed of operation and required precision must be considered. The handbook contains more than 1800 references, mostly related to American publications.

**Fire and Polymers: Hazard Identification and Prevention**, edited by Gordon L. Nelson, Florida Institute of Technology, Melbourne, Florida 32902-2366, U.S.A., 627 pages, ISBN 0-8412-1779-3, American Chemical Society ACS Symposium Series 425, Washington, D.C., U.S.A. (1990), US\$ 99.95.

Given the importance of the involvements in fire as a social issue and the complexity and interest in the relevant basic science, a one week ACS-Symposium was organized in April 1989 in Dallas, Texas, and now updated proceedings were published. It was noticed that the emphasis of research devoted to decreasing losses from fires is shifting from improvements in flame extinguishing to the development of fire-retardant and fire-resistant materials and materials that generate less-corrosive and less-toxic products upon burning. In fact, many innovations can reduce human losses: less-flammable materials, early and accurate fire and smoke detection devices, and reliable fire-suppression systems. A balancing of risk, cost, and desirability is however needed, and the well presented volume focuses on the basic science. High heat polymers, fire performance of polymers, hazard modeling, mechanism of flammability and fire retardation, char formation, effects of surfaces on flammability, smoke assessment and formation mechanisms, and combustion product toxicity are thus discussed.

The 34 chapters are structured into the five sections:

—Fire Toxicity (including steps in hazard evaluation and a chapter on chemical analysis of fire effluents),

—(Organic and Inorganic) Fire Retardants and Fire-Retardant Commodity Plastics (dealing also with degradation),

—Fire Retardancy in Engineering Plastics (dealing also with char formation, effects of coating, and synergistic effects),

—Fire and Cellulosics (dealing also with influences of structures, metal ions, and self-heating), and

—Fire Performance, Testing and Risk (dealing also with fire properties, regulations, and model predictions).

**Analytical Chemistry for Humans and Environment** (in German), by Jürgen Angerer and Marika Geldmacher-von Mallinckrodt, D-W-8520 Erlangen, 158 pages, ISBN 3-527-27407-3, DFG Deutsche Forschungsgesellschaft, VCH-Verlagsgesellschaft mbH, Weinheim Basel Cambridge New York (1990), DM 58.00.

The volume includes the contributions to a German meeting that took place in Bonn in November 1988. It is tried to explain the activities of the German Research Society (DFG) in the field of analytical chemistry, to discuss the limitations of trace analytical chemistry in complex matrices, and to improve the interpretation of environmental and health oriented analytical data. The contributing scientists thus discuss

- the fundamentals of analytical conceptions,
- steps in analytical chemistry,
- interpretation of analytical results, and
- panel statements.

Special attention is given to analytical chemistry in metabolism and protein-adducts, and of course to sampling and data confirmation.

**Petroleum Contaminated Soils, Volume 1: Remediation Techniques, Environmental Fate, Risk Assessment**, by Paul T. Kostecki and Edward J. Calabrese, University of Massachusetts, Amherst, Massachusetts, U.S.A., 357 pages, ISBN 0-87371-135-1, Lewis Publishers, Inc. Chelsea, Michigan, U.S.A. (1989), £43.65.

These proceedings of the Second National Conference on the Environmental and Public Health Effects of Soils contaminated with Petroleum Products at the University of Massachusetts, Amherst, contain 24 contributions by 54 American and Canadian scientists. Petroleum contamination had been largely perceived as a groundwater contamination problem prior to the early 1980's, but then petroleum contaminated soils emerged also as a major domestic environmental issue. Scientists, engineers, and regulators had to interact to find practical and scientifically defensible solutions for handling them. The book deals of course mainly with organic petroleum pollutants, but the role of some metal compounds is also discussed, for instance their function as indirect chemical markers (e.g. V, Zr), their interference in waste water with binding of cement (e.g. Cd, Ni), and their behavior in immobilization processes, such as in situ vitrification (e.g. Pb, Cd; the latter is not very soluble in glass and may be released again).

The important volume is structured into the four parts:

- Defining the Problem,
- Environmental Fate and Modeling,
- Remedial Options, and
- Risk Assessment/Risk Management.

Robert K. Tucker, Trenton (New Jersey) and Daniel Hillel, Amherst (Massachusetts) present for instance an overview of the behavior of petroleum products (e.g. PAHs) in water, air and soils, particularly their transport and distribution mechanisms by the interpretation of changing patterns, unfortunately not giving much literature. Walter J. Shields et al., Bellevue (Washington) applied an onsite spill model to petroleum product spills. Michael A. Callahan, EPA, Washington, D. C. discusses the utility of environmental fate models to regulatory programs. Regarding available remedial technologies interferences with stabilization/solidification processes are evaluated, and in situ vitrification, asphalt batching, incorporation into bituminous concrete, low temperature stripping, and recovery techniques are compared, in the laboratory and in the field. Among the risk assessment studies Mohamed S. Abdel-Rahman et al., Newark (New Jersey) determined for instance the exposure of oral and dermal benzene from contaminated soil, and Edward Calabrese et al., Amherst (Massachusetts) estimated how much soil children eat. These two contributions are well documented. Of course sandy and clay soil behave differently.

**Environments at Risk: Case Histories of Impact Assessment**, by Prof. Dr. Derek Ellis, Biology Department, University of Victoria, British Columbia V8W 2Y2, Canada, 329 pages, ISBN 3-540-51180-6, Springer-Verlag Berlin Heidelberg New York London Paris Tokyo Hong Kong (1989), DM 68.00.

This is an unconventional, but honest and straight approach, since the author presents in a pragmatic way worldwide experiences, not trying to develop a common theory. But he and the readers learn from each "model". In fact "the method" helps appraising similar cases. The author thus recommends to first read one of the ten case histories before looking at the introduction:

- Construction Assessment; Hell's Gate (Canada),
- Chemicals Assessment: Minamata (Japan),
- Mining Assessment: Island Copper (Canada),
- Organic Chemicals, Pulp and Paper Assessment: Annal Point (Scotland),
- Sewage Assessment: Victoria (Canada),
- Spills Assessment: Amoco Cadiz (France), Bhopal (India), Chernobyl (U.S.S.R.),
- Multiple and Dispersed Impacts Assessment: Acid Rain (U.S.A., Canada), the Thames Estuary (England); here one misses however Scandinavian and Middle-European know-how),
- Risk Reduction by Environmental Audits: Marcopper Mining Corp. (The Philippines), Bougainville Copper Mine (Papua New Guinea),
- Risk Reduction by Permitting and Regulating: Quartz Hill Molybdenum Mine (Alaska), Yabulu Nickel Refinery (Australia), and
- Risk Reduction by Fact-Finding and Social Input—Public Hearing (Mining, Canada) and a Multinational AGM (Rio Tinto Zinc, England).

The author has added a last chapter on issues of self-help. The book helps how to learn to minimize risks by combining information from assessments at other similar developments (case histories) with site information from locations with new achievements. Environmental managers, assessors and concerned citizens get proposals how to distribute necessary communication.

**Directory of Agents Being Tested for Carcinogenicity, Number 14**, by W.H.O. and I.A.R.C., 379 pages (including a list of Chemical Abstracts services registry numbers, and a very useful cross index of (chemical) names of 41 pages), ISBN 92832134-9, International Agency for Research on Cancer, Lyon (1990), Sfr. 45.00, US\$ 33.00.

I.A.R.C. together with the U.S. National Cancer Institute (N.C.I.) initiated in 1973 an international questionnaire survey of institutes undertaking long-term testing chemicals for carcinogenicity. Of the 983 chemicals or agents undergoing long-term carcinogenicity testing, 102 (about 10%) have already been evaluated before Dir-

ectory Number 13 in the first 46 volumes of the IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans. Thirty-five of these 983 chemicals were found either to be definitely associated with, or highly probably associated with human cancer, and for 67 of these chemicals sufficient evidence of carcinogenicity in experimental animals has already been demonstrated. This Directory Number 14 now gives data received from 80 institutes in 20 countries on 922 chemicals. 188 of them (20%) have already been evaluated in the first 52 volumes of the IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Fourteen of these 922 chemicals or agents have already been classified as carcinogens to humans, 15 as probably carcinogenic to humans, and 74 as carcinogenic to experimental animals. The new Directory lists new studies, indicating species and exposure routes (including dose levels) used, informing also on investigators.

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