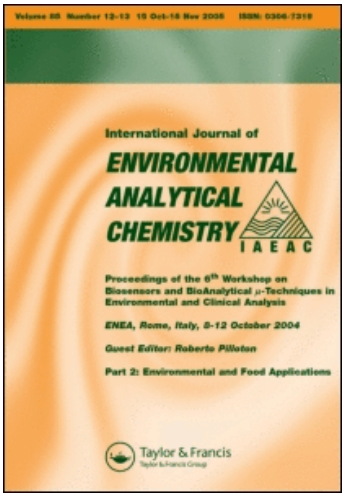

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Book Reviews

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Book Reviews

ANALYSES OF HAZARDOUS SUBSTANCES IN BIOLOGICAL MATERIALS, Volume 1, by Jürgen Angerer, Central Institute for Occupational Medicine, D-2000 Hamburg 76, and Karl-Heinz Schaller, University Institute for Occupational and Social Medicine, D-8520 Erlangen, 222 pages (including 31 figures, 41 tables, and an address list of Members and Guests of the Working Subgroup "Analyses of Hazardous Substances in Biological Materials" of the Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area (Chairman: Dietrich Henschler, University of D-8700 Würzburg)), linen, format 245 × 176 mm, ISBN 3-527-260951-1, VCH-Verlagsgesellschaft, D-6940 Weinheim (1985), DM 90.

The monograph is concerned with methods for the detection of hazardous substances in biological materials. It thus provides the basis for the establishment of the new category of biological tolerance values for working materials, which was introduced into the German list of occupational exposure limits. Preference has been given to representative determination of profiles of exposure over time at the workplace, before claims for simplicity and economic feasibility. Scientific argumentation is thought to be more important than administrative commodity, and the selection of methods is said to be governed by the general principles of occupational medicine.

Nowadays reliable analytical methods for monitoring are available, and the book thus comprises methods for the determinations in urine or blood of sixteen hazardous compounds frequently encountered in occupational environments (including common car-

cinogenic substances and their metabolites). Among the organic compounds aromatic amines, benzene derivatives, trichloroacetic acid, phenol and chlorophenols, and hippuric acid and its methyl derivatives may be mentioned. Bromides, beryllium, cadmium, nickel and thallium compounds are inorganic substances which have to be monitored exactly. Atomic absorption spectrometry, photometric methods, and gas and liquid chromatography are preferably applied. The description of each method includes an evaluation of the method, a brief listing of the reliability criteria, and general information on the chemical compound to be tested (e.g. its industrial importance, toxicity, metabolism, toxicokinetics, and its normal and limit values in biological material as far as they are known). This is followed by a detailed description of the preparatory and analytical steps, discussion of the reliability, and a reference list. Much attention is given to sampling and calibration, as well as to sources of errors.

The book can be recommended to chemists, especially analytical chemists in industry, government agencies and universities, safety guards, toxicologists, specialists in forensic and industrial medicine. But it is also a valuable handbook for other persons responsible for occupational hygiene and for monitoring environments, because it gives a general understanding of problems, a relevant feeling about risks with the sixteen substance categories mentioned, and because it is well structured. Also without the missing subject index, it is easy to find the facts one looks for. Of general interest are also the preliminary remarks on the particulars of analyses in biological materials, and explanations about the terms and symbols used.

MUTAGENICITY TESTING IN ENVIRONMENTAL POLLUTION CONTROL, Series in Analytical Chemistry, edited by K. F. Zimmermann, Technical University D-6100 Darmstadt and R. E. Taylor-Mayer, Slippery Rock University, Pennsylvania 16507, U.S.A., 195 pages (including an introduction, references added to each chapter, 50 figures, 34 tables, a good index of 7 pages (in which one misses however arsenic, beryllium, cadmium, chromium and nickel), linen, format 247 × 173 mm, ISBN 0-85312-681-X, Ellis Horwood Ltd., Chichester, West Sussex PO19 1EB, England (1985), £27.50.

This well presented book, written by active researchers in the Federal Republic of Germany, in the United States, in Canada, in The Netherlands, in Japan, and in Wales is an excellent introduction to the problem of mutagenicity testing (with a range of examples). It is thus a necessary supplement to other handbooks, but it should not only stay in libraries: it should be at hand in many laboratories. Difficulties in assessing the genetic risk to humans are discussed in a critical way, and the necessity for a test battery covering the full spectrum of genetic changes in eukaryotes are documented. Real life case studies are concerned with the analysis of technical products, food and beverages, river and marine environments, water and wastewater, and the mutagenic pollution of agricultural land. The authors also discuss why in future carcinogenic units should be defined, why systems for dose limitations of known carcinogens should be established, and why methods to measure chemical damage per base pair should be developed. The useful volume is well structured into 11 chapters:

—The Genetic Apparatus of Man
—Mutagenicity Testing—Some Background Information
—Chemical Separation and *in situ* Mutagenicity Testing
—Mutagenic Activity in Dutch River Waters and its Biological Significance for Fish
—The Detection of Mutagens in the Tissue of Marine Organisms exposed to Environmental Pollutants
—Detection of Genetic Activity in Effluents from Pulp and Paper Mills (Yeast)
—*In vitro* Mutagenicity Testing of Airborne Particulates (perhaps this chapter should be extended in a new edition, discussing more sampling, distribution of mutagens in airborne particulates, bioavailability, specific information on some inorganic (cadmium, etc.) and organic (PAH's, O_2N-PAH's) constituants)
—Genetic Assay of Maize for Environment Pollution Control
—Induction of Mitotic Aneuploidy in Yeast with Aprotic Polar Solvents
—Ionizing Radiation—a Case Study in the Evolution of Risk Evaluation.

Since in most situations one finds complex mixtures, highly variable in content from one geographical location to another, there are

unique challenges for new research, including the use of assays on indigenous animal and plant species (which may provide an assessment of pollutants as they occur in the air and in waters). A new goal is to approach combining of fractionation, analytical chemistry, and biological mutation assays. Since immediate effects can readily be detected, the short term described may also allow preventive actions against long term, delayed effects.

CHEMICAL METHODS FOR ASSESSING BIO-AVAILABLE METALS IN SLUDGES AND SOILS, edited by R. Leschner, D-1000 Berlin, R. D. Davis, Medmenham, Bucks. SL7 2HD, U.K. and P. L'Hermite, C.E.C., B-1050 Brussels, 96 pages (including 28 figures, 33 tables, newest literature references, an address list of 40 experts (mainly from governmental and university institutes), but no index), linen, format 228 × 148 mm, ISBN 0-85334-359-4, Elsevier Applied Science Publishers, Barking, Essex IG11 8JU, U.K. (1985), £20.

The book constitutes the proceedings of a seminar held in D-4400 Münster in April 1984 (under the auspices of the Commission of the European Communities, as part of the Concerted Action COST 681, "Treatment and Use of Organic Sludges and Liquid Agricultural Wastes"). Utilization of sewage sludge on agricultural land is an essential disposal route accounting for about one third of the sewage sludge produced annually by the EEC countries. Heavy metals in sewage sludge applied to land accumulate in the cultivated layer, and rates of application of sludge have to be restricted so that soil concentrations of metals never reach levels that could deteriously affect crop production or the food chain. Assessment of the polluting potential of heavy metals in this context requires definition of the extent to which the metals are available for crop uptake.

Instead of time consuming agricultural trials with selected indicator plants (which may not even be relevant for estimation of food chain effects) to measure bioavailibility, and instead of physicochemical model procedures (which are often not very realistic), various new chemical methods were developed for assessing bioavailable metals in soils. Use of soil solution, single-step neutral salt extractants, and more complex multistep procedures provide a basis

for research purposes, for routine monitoring of sludge-treated soils, and for improving the extra polation to regulatory metal limits for such soils.

Six presentations of German, Belgian, Swiss, British and French experts from technical universities or research institutes discuss chemical forms and reactivities of metals in sediments, principles of mobility, effects of incubation on various soils, and physiological mechanisms. Studies with soil solutions or with neutral salt (sodium nitrate and calcium chloride) solutions lead to more representative results than extraction with acid solutions or with complex forming agents. The booklet can be highly recommended, especially to those evaluating soil contamination by cadmium, zinc and copper.

HEAVY METALS IN NATURAL WATERS (Applied Monitoring and Impact Assessment), by James W. Moore and S. Ramamoorthy, Alberta Environmental Centre, Vegreville, Alberta T0B 4L0, Canada, 268 pages (including 48 figures, 85 tables, references added to each chapter, three appendices on production and uses of metals, on physical and chemical terms, and on common and scientific names of fishes, and an index of 6 pages), cloth, format 242 × 159 mm, ISBN 3-540-90885-4, Springer-Verlag, Berlin–Heidelberg–New York–Tokyo (1984), DM 108, US$40.30.

The volume is an addition to Springer Series on Environmental Management, and is said to be addressed to scholars and practitioners concerned with the principles and applications of environmental management. Besides an introduction it is structured into 11 chapters on:

—arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc
—impact of heavy metals in natural waters
—monitoring and impact assessment approaches
—politics and the environmental manager.

It is not clear why manganese and iron are completely missing, although they are primarily controlling biochemistry of lakes and oceans (playing an important role in photochemistry and production

of phytoplankton. One misses also relevant descriptors in the index, such as bacteria, bioavailability, cells, cell membranes, cycles, micro-organisms, phytoplankton, speciation (although it is discussed to some extent in some chapters), and the term "transport" is restricted to sedimentation and mobilisation, and for instance does not refer to bioavailability and to transport through cell membranes, processes which determine cycles and biological effects. Literature used is mostly 10 years old, and for instance information on carcinogenicity is not up-dated (for instance relevant literature by Bianchi, Koeman, Levy, Mart, Nordberg, Nürnberg, Stoeppler, Stumm and Sunderman is not even mentioned), and refers to some arbitrarily chosen observations of mammals, and for instance not of fish. Besides remarks on biomonitoring it is not quite clear what the authors understand by "an interdisciplinary approach to monitoring and impact assessment", although they make some general remarks about chemical and biological criteria. The reader thus not find practical advice how to monitor, nor are sampling and analytical techniques (and their interpretation) discussed and compared. The title and the subtitle of the book is thus in many ways misleading. It is also questionable to state "that specific fields, such as pharmacokinetics are not considered in detail, because they cannot directly be used in monitoring and impact assessment", since almost everybody has learnt by now, that one should quantify critical chemical species and metabolities, rather than total element concentrations.

Nevertheless the book contains a large amount of interesting environmental data on eight heavy metals, also well presented in figures and tables. And one finds especially relevant information related to critical geographical regions, which information may also be valuable for a better understanding of other ecosystems.

CHEMICAL TOXICOLOGY AND CLINICAL CHEMISTRY OF METALS, edited by Stanley S. Brown, Dudley Road Hospital, Birmingham, U.K. and John Savory, University of Virginia, Charlottesville, Virginia, U.S.A., 416 pages (including 86 figures, 72 tables, references added to each chapter, and author index of 4 pages, and a subject index of 6 pages), linen, format 235 × 158 mm, ISBN 0-12-137520-X, Academic Press Inc. Ltd., Oval Road, London NW1, England (1983), US$38.50.

After the excellent First International Conference on Chemical Toxicology and Clinical Chemistry of Metals 1977 in Monte Carlo (Proceedings by Elsevier/North-Holland Biomedical Press 1977) an interdisciplinary group of experts and the IUPAC Clinical Chemistry Division (Commission on Toxicology) organized the 2nd Conference in the series on the same scientifically high standard July 1983 in Montreal (Canada). Stanley S. Brown and John Savory have now selected 62 relevant presentations for the proceedings out of 140 contributed papers. The scope ranges from clinical and epidemiological case histories to studies of cellular and molecular mechanisms. The important book is structured into four parts:

—Analysis and Quality Assurance
—Occupational and Environmental Exposures
—Speciation and Interaction
—Clinical and Experimental Studies.

In the first part besides the discussion of determination techniques contamination control, sample processing, interlaboratory comparisons and certified reference materials are handled by competent experts. Also in the second part one finds valuable information on monitoring, and for instance a paper on "the use" and the "misuse" of human hair in trace metal analysis (by two specialists from the Rush-Presbyterian-St. Luke's Medical Center, Chicago, Illinois, U.S.A.). Part III contains for instance also papers on computer models of metal biochemistry and metabolism, on molecular targets of metal toxicity, and on genotoxicity of stannous chloride in mammalian cell tests. One finds newest information preferably on aluminium, cadmium, lead, mercury, nickel, and zinc, which elements are discussed with some priority, but also on other metals.

ERNEST MERIAN