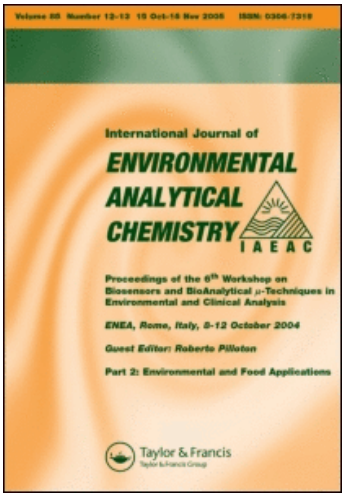

International Journal of Environmental Analytical Chemistry
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713640455

Book Reviews

To cite this Article (1987) 'Book Reviews', International Journal of Environmental Analytical Chemistry, 30: 4, 309 — 320
To link to this Article: DOI: 10.1080/03067318708075479
URL: http://dx.doi.org/10.1080/03067318708075479

Intern. J. Environ. Anal. Chem., 1987, Vol. 30, pp. 309–320
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Printed in Great Britain

Book Reviews

HANDBOOK ON THE TOXICOLOGY OF METALS, Second Edition (Volume I: General Aspects; Volume II: Specific Metals), by Dr. Lars Friberg, Karolinska Institute, S-104 01 Stockholm and Dr. Gunnar F. Nordberg, University of S-901 87 Umeå, 460 + 696 pages (including 80 figures, 28 tables, and a subject index of 24 pages), linen, format 246 × 174 mm, ISBN 0-444-90413-1 and 0-444-90442-5, Elsevier Science Publishers, NL-1000 BM Amsterdam (1986), US$ 255.50, hfl. 690.00.

Since the First Edition 1979 (see for instance *Toxicological and Environmental Chemistry* (Gordon and Breach, Science Publishers), **3,** Nos. 3 + 4, pages 326–327 (1981) this extremely useful handbook has been updated. It is again well structured, and allows an easy access to data for physicians, toxicologists and engineers in the fields of environmental and especially of occupational health. Special emphasis has been laid on the toxic effects in humans (although some effects in animals and biological systems *in vitro* are also discussed when relevant for human toxicity). It must however be noted that not too much new literature references were added relating to studies achieved between 1979 and 1986, and the somewhat uncomplete subject index should perhaps be amended in a third edition. But many chapters are rewritten and extended by worldwide recognized experts, so that the reader finds even more balanced and significant information than in the already excellent first edition. The authors mentioned that besides the classical human exposures to natural and anthropogenic (from mining, smelting, fuel combustion and industrial applications) metal compound pollutions, one must consider catalysts, heat stabilizers, plating, superconductors, metallic glasses, magnetic alloys, and high-strength low-

alloy steel. It is also stated that metals unlike organic compounds do not break down (once absorbed, a metal stays in the body until it is excreted), and that inhalation and skin penetration are the most important occupational routes (not forgetting tobacco smoke, which contains for instance cadmium).

Part I contains 15 chapters this time: The chapter "Sampling and Analytical Methods" has been entirely rewritten and now includes a detailed discussion on quality assurance. But the information given is still rather general, to get an understanding for the non-chemist users of the book. One misses for instance references to the excellent work of H. W. Nürnberg, M. Stoeppler and G. Tölg, and speciation is still not discussed in this chapter (the term is mentioned in the chapter on risk assessment). The chapter "Sources, Transport and Transformation of Metals in the Environment" is shortened, and practically not up-dated, which is also true for the following chapter "Routes of Exposure, Dose and Metabolism of Metals". In the chapter "Factors Influencing Effects and Dose-Response Relationships of Metals" one finds a new subchapter "Interactions involving Metallothioneins", and another important one on "Metal Interactions in Carcinogenesis". Other chapters—such as the one on "General Aspects of and Specific Data on Ecological Effects of Metals"—are again practically identical with the 1979 version. An excellent new chapter on "Risk Assessment of Metals" (replacing an old one on standards and criteria) has then been included, which informs also on critical concentration on a population basis, on statistical aspects, on extrapolation from animal data to man, and on safety factors. The chapter "Mutagenic and Carcinogenic Effects of Metals" has also been revised to include new data, although one misses most of the results of the International Workshop on Carcinogenic and/or Mutagenic Metal Compounds (Geneva 1983, publications by Gordon and Breach Science). It is however a real improvement that a new chapter on "Reproductive and Developmental Toxicity of Metals" has been included (with literature references up to 1984).

Part II includes again—in alphabetical order—information on the same 28 specific metals (including also not so often described metals, such as barium, germanium, indium, tungsten, and uranium) treated in the first edition. The authors have again used the excellent common format, which easily allows comparisons and finding of

crucial information. Each element chapter is thus structured into 8–10 subchapters: an abstract (with excellent rapid first information for the hurried reader), physical and chemical properties, methods and problems of analysis, production and uses, environmental levels and exposures, biological function and metabolism, levels in tissues and biological fluids, effects and dose-response relationships, carcinogenic effects, and treatment of intoxications. Not all chapters have been up-dated to the same extent, but "aluminium", "copper", "manganese", "selenium", "tellurium", and "tin" have been re-written by new co-authors. On the other side the newest literature reference in "beryllium" dates from 1980, and the excellent work of D. N. Skilleter is not even mentioned. "Lead" is up-dated, but one misses for instance data on long-range transport (e.g. E. Steinnes), and among effects on populations (and on the nervous system) the important studies of H.-W. Schlipköter, U. Ewers and G. Winneke are not discussed. "Thallium" has not changed really, and one should add German expertise (e.g. Fr. H. Kemper) in a third edition. Besides one exception all literature cited for "tungsten" is older than 1977, and also "uranium" has practically not been up-dated (newest literature with four exceptions from 1975). "Zinc" has been up-dated somewhat, but one still misses discussions of important studies, for instance by K. M. Hambridge, R. J. Henkin, K. Schmidt, P. Schramel, and others. Besides these deficiencies, it is a must to consult these handbooks, although the increase of the number of pages (compared to the first edition) results mainly from a different readable composition face of the printed page needing more space.

E. MERIAN

CORROSION OF MATERIALS BY ATMOSPHERIC POLLUTION, VDI Communication No. 530, 257 pages (including 77 figures, 37 tables, not too many literature references at the end of the chapters, no index), in German, cloth, format 230 × 159 mm, ISBN 3-18-090530-1, VDI Publishers Ltd., D-4000 Düsseldorf (1985).

The VDI (Verein Deutscher Ingenieure "Society of German Engineers") has a Commission dealing with air pollution prevention,

and which regularly organizes excellent scientific interdisciplinary discussions on topics related to the atmospheric environment. For instance, in October 1984, a colloqium on "Corrosion of Materials by Atmospheric Pollution" took place in Cologne (FDR). It was advantageous that in this important problem field some facts came together, and the Proceedings now enclose 18 papers, presented mostly by German experts. They deal particularly with the corrosion of buildings, glass windows, stones, concrete, wood, steel, polymers (textiles, damaged especially by NO_x), and advantages and disadvantages of protection methods. These damages are of similar importance as forest decline or health effects by atmospheric pollutants, but only in the last 10–15 years was it tried to get a better understanding of the mechanisms which are responsible for damages of edifices and constructions. For instance about 5 millions of DM's are spent annually for repairs of the Cologne dome, and it is thought that the costs of material corrosion in the Federal Republic of Germany is annually in the order of 3–4 billions of DM's (not taking into account that lost objets d'art cannot be replaced). While chemists and engineers describe the mechanisms of material corrosion, I. Heinz (D-4600 Dortmund) has extrapolated social costs of materials damages. To avoid such damages, one has to look at them in a differentiated way, but one has to think in interdisciplinary systems of networks. The book discusses also, besides analysing case studies, how materials could be made more durable or resistant, which protection systems could be promising, and perhaps first of all how could critical emissions be reduced. For instance E. Böhm, D-7500 Karlsruhe analysed systematically the possibilities to reduce NO_x emissions.

E. MERIAN

ATMOSPHERIC TRACE SUBSTANCES, AND THEIR PHYSICOCHEMICAL BEHAVIOUR (in German), edited by Prof. Dr. K. H. Becker, Technical University of D-5600 Wuppertal 1 and Dr. J. Löbel, D-4000 Düsseldorf 1, 264 pages (including 81 figures, 29 tables, many equations, and a subject index of 9 pages), paper board, format 241 × 165 mm, ISBN 3-540-15503-1, Springer-Verlag, Berlin–Heidelberg–New York, 1985.

The observed forest damages make it necessary to get a better understanding on the transformations and on the transports of atmospheric pollutants, and the authors—based on experience with their seminars—were able to close a gap. The reader thus finds useful basic information and education on modelling. The book is structured into 14 chapters, informing:

— quantitatively on emissions in German regions;
— on interactions in the atmosphere and their kinetics, radicals, and half-life times of selected compounds (e.g. benzene about 10 days, toluene about 2 days);
— on aerosols and colloids (and their adsorption capacities), and on reactions in (cloud) droplets (R. Niessner and D. Klockow, D-4600 Dortmund 50 inform for instance on sampling and on the analytical chemistry of rain droplets, looking for various ions and H_2O_2);
— on horizontal and vertical diffusion, on simulation of deposition (including nucleation).

Especially the mathematical models, but also other parts of the book, describe preferably principles (much more cannot be expected in such a handy volume), and one does not find too many practical indications related to the real world. That is to say that concrete atmospheric chemistry problems (and case studies, which would help to understand the theoretical background) are almost not discussed. The booklet is mostly written by physicochemists and meteorologists, which may not be so much experts in specific atmospheric chemical reactions. They rather try to simplify correlations, and to find some common properties of thousands of present pollutants. For instance nitration in the atmosphere—which may be a critical process—is not mentioned, and also reactions of H_2O_2 are not analysed in detail.

E. MERIAN

GROUND WATER QUALITY (Series on Environmental Science and Technology), edited by C. H. Ward, Rice University, Houston, Texas; Walter Giger, Swiss Federal Institute for Water Resources and Water Pollution Control, CH-8600 Dübendorf; and P. L. McCarthy, Stanford University, California. 547 pages (including 175

figures, 128 tables, several equations, and a subject index of 15 pages), hard cover, format 240 × 168 mm, ISBN 0-471-81597-7, John Wiley & Sons, Interscience Publishers, New York–Chichester–Brisbane–Toronto–Singapore (1985), £66.45.

In October 1981 the First International Conference on Ground Water Quality Research took place at the Rice University in Houston, Texas, U.S.A. The volume is said not to be the proceedings, rather to bring together 28 updated significant papers by internationally recognized experts (mainly from the U.S.A., but also from the U.K., the Netherlands, New Zealand, the Federal Republic of Germany, and Switzerland). The book is thus representing a comprehensive, authoritative analysis of both the chemical and the biological processes affecting ground water quality. After an Introduction and Perspectives the volume is thus structured into four parts:

— Sources, Types, and Quantities of Contaminants in Ground Water;
— Methods for Ground Water Quality Research;
— Subsurface Characterization in Relation to Ground Water Pollution; and
— Transport and Fate of Subsurface Contaminants.

The science presented is relatively new (we have just made a beginning in understanding), and there is little doubt that water shortages, ground water contamination, and increased reliance on underground water resources will add substantially to the demands for knowledge from researchers of ground water quality. The behaviour of pollutants in the subsurface and of the processes that take place in this environment is paramount to the accomplishment of the goals of gathering information which allows us to manage waste sources, of developing means of making accurate damage assessments, and of developing technologies which will allow us to take the most feasible remedial action necessary to restore an aquifer. There is yet another area of ground water research that is just now emerging, that being an attempt to understand the abiotic and biological processes involved with pollutant transport and transformation. The book can thus strongly be recommended to environmental chemists and engineers, and all those who are re-

sponsible for water, soil and landfill management. Influences of mechanical interactions—such as pumping—are also discussed, as well as leaching and infiltration. An interesting chapter is devoted to biochemical methods for the detection of subsurface contamination, and others deal with SIA (Surface Impoundment Assessment) and other rating systems. The role of the microcosm (also biodegradation and survival is discussed) and the interaction between organic molecules and mineral surfaces are also analyzed. Unfortunately the index is not very complete, and the reader thus may not find easily all the significant informations contained in the interesting book (which contains as an example much more data on benzene and toulene in soil and ground water, than one would expect from consulting the index).

E. MERIAN

THE ECOLOGY OF MARINE SEDIMENTS, by Prof. Dr. John S. Gray, Institute for Marine Biology, N-Blindern Oslo 3, translated into German by Dr. Heye Rumohr, D-2300 Kiel 1, 193 pages (including 70 figures, 22 tables, a subject index of five pages), paper board, format 243 × 166 mm, ISBN 3-540-13037-3, Springer-Verlag, Berlin–Heidelberg–New York–Tokyo (1984), DM 49.50, US$ approx. 19.40.

Only a small part of marine soils consists in rocks and corals, but ecological research related to fauna and flora is mainly going on in these areas, which are relatively easy to study without disturbing their environment. Contrary to these situations fauna hidden in the much more important soft sediments is difficult to observe, and population densities are difficult to estimate. There is thus a gap in overviews on benthos-ecology of soft marine soils. The author discusses structural, physiological and functional aspects in a balanced way. The original English version published by the Press Syndicate of the Univirsity of Cambridge, U.K. has been brought up-to-date and completed, for instance with information on larvae and on nutrition of the organisms. At the end of the valuable booklet one finds nine pages with literature references for further information. The publication includes 12 chapters [Benthal Fauna,

the Sediments and Abiotic Environmental Parameters, Frequency Distributions of Species and Individuals, Classification of Concentrations of Species, Niches in Benthos-Ecology, Diversity, Stability, Effects of Pollution on Benthos-Populations (with too high concentrations of organic substances and with some effluents disappearance of some species and prevalence of others are observed), Monitoring of Benthos-Ecology, the Hypothesis of Trophic-Group Amensalism, Functions and Factors]. The last chapters inform especially on secondary production, on oxygen budgets, on energy budgets, on metabolisms, and on modelling. Situations may be very different, for instance when comparing the North and the Baltic seas. In the latter we have to do with mixtures of river and sea water without tides, and thus certain stratification of the sediments and with reduced numbers of organisms. Models of the Baltic sea are thus simpler.

E. MERIAN

DERMAL EXPOSURE RELATED TO PESTICIDE USE (Discussion of Risk Assessment, ACS Symposium, Series No. 273), edited by Richard C. Honeycutt, Ciba-Geigy, Greensboro, N.C. 27419, U.S.A.; Gunter Zweig, University of California, Berkeley, CA 94720, U.S.A.: and Nancy N. Ragsdale, Department of Agriculture. 529 pages (including 78 figures, 163 tables, non-technical summaries and literature references added to the contributions, and a valuable subject index of 21 pages), linen, format 234 × 159 mm, ISBN 0-8412-0898-0, American Chemical Society, Washington, DC 20036, U.S.A. (1985), US$ 79.95 (for U.S.A. and Canada), US$ 95.95 (for other countries).

The Proceedings are based on a symposium which took place in April 1984 in St. Louis, Missouri, U.S.A. with the goal to improve workplace safety for pesticide chemists and for agricultural workers (farmworkers and home gardeners). Information from dermal absorption studies, from field exposure studies, and of toxicology-risk assessment is thus integrated. Thirty-five papers by U.S. experts (one exception from Canada) are structured into five sections:

— Dermal Absorption (with indications on measuring);
— Field Studies: Methodology (with information on monitoring);
— Exposure Studies with Specific Chemicals (inhalation and other applications);
— Trends in Exposure Assessment and Protection (including databases and models);
— Integration of Experimental Data (risk assessment, social consequences, etc.).

The volume thus handles in detail measurement of exposures and of absorptions (using experimental techniques), and interpretation of data.

E. MERIAN

RENAL EFFECTS OF PETROLEUM HYDROCARBONS (Volume VII of Advances in Modern Environmental Toxicology), edited by Myron A. Mehlman, Mobil Oil Corporation, New York 10017; George P. Hemstreet III, University of Oklahoma Health Services Center; John J. Thope, New Jersey College of Medicine and Dentistry, Ruthers University; and Neill K. Weaver, American Petroleum Institute. 306 pages (including 52 figures, 106 tables, newest literature references up to 1984 added to each contribution, and a subject index of 6 pages), cloth, format 236 × 161 mm, ISBN 0-911131-08-6, Princeton Scientific Publishers Inc., Princeton, New Jersey 08540 (1984), £62.85.

In 1978 it was discovered that long-term exposure to wholly vaporized unleaded gasoline on rats leads to kidney cancer. The question arises whether normal exposure to gasoline vapor represents a significant human health hazard. In June 1983 the American Petroleum Institute thus sponsored a Workshop under the Chairmanship of Dr. Leon Goldberg, Duke University Medical School in Boston, Massachusetts on the kidney effects of hydrocarbons, hoping to enhance the understanding of the problems and the ability to formulate future research. It was also a goal to know with greater precision how much contact workers and consumers have with gasoline and its constituents and to extrapolate existing epidemiological kidney cancer studies. The participants were mainly coming

from the U.S.A., with few exceptions from Canada, Sweden, the Netherlands, and Italy. The Proceedings contain 19 chapters, and are structured [after preliminaries on chemistry and composition in relation to petroleum-derived fuels and solvents (paraffins, olefins, naphthenes, and aromatics, including those from alkylation, fluid catalytic cracking, and catalytic reforming), and on the biology of the kidney (discussing also similarities and differences between rat and human kidneys)] into three sections:

— Animal Studies (comparing also lesions by hydrocarbons and non-hydrocarbons, including old-rat nephropathy);
— Human Studies (including epidemiology); and
— Integration and Interpretation (evaluation of toxicity significance).

It was shown that chronic inhalation of unleaded gasoline by male rats leads to a significant increase of hyperplasias, dysplasias, adenomas, and carcinomas in kidneys, but that the mechanism of hydrocarbon nephrotoxicity still remains unknown. Epidemiological studies, thus far, fail however to demonstrate any consistent association between inhalation of gasoline by humans and the incidence of malignancy or chronic renal disease (a similar situation exists for lead, which is a weak renal carcinogen in rat, but to our present knowledge not in humans). Negative mutagenicity tests with gasoline suggest anyway that these compounds may only act as non-genotoxic carcinogens or as promotors and/or carcinogens.

E. MERIAN

BLACK CARBON IN THE ENVIRONMENT (Properties and Distribution, Series on Environmental Science and Technology), by Edward D. Goldberg, Scripps Institution of Oceanography, University of California at San Diego, La Jolla, California, 198 pages (including 57 figures, 36 tables, an appendix of 24 pages on Analytical Techniques for Black Carbon, 16 pages with literature references, and a subject index of 10 pages), cloth, format 236 × 158 mm, ISBN 0-471-81979-4, John Wiley & Sons, Interscience Publishers, New York–Chichester–Brisbane (1985), £34.65.

Black carbon ("combustion-produced black particulate carbon having a graphitic microstructure") is one of the uniquitous materials circulating around the surface of the earth. One finds these particles from natural and anthropogenic combustion even in deep sea deposits. The author is interested in characterization of the major substances in such particles, which play a role as catalysts for gaseous reactions, as carriers for pollutants showing health effects (e.g. in human lungs), and which information can be used to get a better understanding of the history of society's involvement with fire, and of the important carbon cycles and budgets. Information from a multitude of sciences—such as anthropology, ecology, forestry, atmospheric pollution, chemical engineering, high temperature chemistry, low temperature geochemistry—are thus analysed for environmental scientists. The booklet contains 10 chapters: What is Black Carbon; The Chemical and Physical Properties of Black Carbon; Black Carbon Formation; The Degradation of Black Carbon; Anthropogenic Black Carbon; Black Carbons in the Environment; Chemical Reactions Involving Black Carbon; Historical Records of Environmental Black Carbon; The Impacts of Combustion Upon the Environment as Recorded by Black Carbon; The Fluxes of Black Carbon to the Environment. Of course one finds also some data on Diesel emissions.

E. MERIAN

WATER CHLORINATION (Chemistry, Environmental Impact and Health Effects), Volume 5, by Robert L. Jolley *et al.*, Oak Ridge National Laboratory, Tennessee, U.S.A., 1,575 pages (including 476 figures, 325 tables, an address list of authors of 14 pages, and a subject index of 33 pages), hard cover, format 243 × 168 mm, ISBN 0-87371-005-3, Lewis Publishers, Inc., Chelsea, Michigan 48118, U.S.A., £64.35.

The permanent records are the results of the Fifth Conference on Water Chlorination, held at Williamsburg, Virginia, June 1984, 116 contributions are structured within 16 sections: Water Chlorination: Basic Issues/Risk: The Bottom Line/Epidemiological Considerations/ Carcinogenic and/or Mutagenic Effects/Toxicology of Disinfectants

and their By-Products/Aquatic Models and Tumor Induction/ Environmental Effects/Disinfection/Reaction Dynamics in Water Chlorination/Chlorine Demand Reactions: Proteins and other Organics/Chemistry of Chloramination/Photochemistry of Oxidants/ Chemical Methods (dealing with analytical chemistry, sum parameters, and monitoring)/Drinking Water Treatment/Cooling Water Treatment/Wastewater Treatment. Each paper was critically reviewed by at least two peers, and thus not all presented papers are included in these proceedings. Of special value are the latest literature references added to each chapter.

It is difficult to sort out highlights out of such a complete overview, but when working in the field one should certainly consult the excellent information presented on evaluated associations between the disinfection of drinking water and bladder and colon cancer in humans, the discussion of mutagenicity and carcinogenicity testing (also of by-products from other sources; besides the already classical haloform studies emphasis is laid on chlorination of several effluents), effects of chlorinated phenols, tumour induction in fish, effects on oysters, other invertebrates and phytoplankton, sampling, HPLC, GC/MS, and voltammetry.

E. MERIAN