

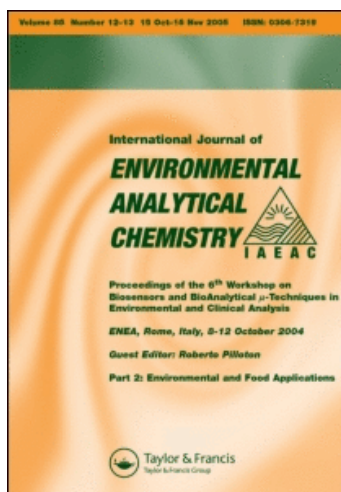
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Book Reviews

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Book Reviews

NITRATES: AN ENVIRONMENTAL ASSESSMENT by the National Academy of Sciences 1978 (Patrick L. Brezonik, Department of Environmental Engineering Sciences, University of Florida, Gainesville was Chairman of the Panel of Nitrates), 748 pages, format 277 × 215 mm, ISBN 0-309-02785-3, printed and available from the National Research Council, Printing and Publishing Office, 2101 Constitution Avenue, N.W. Washington, D.C. 20418, U.S.A. \$15.25.

The World Health Organization has published in 1977 the Environmental Health Criteria 5 "Nitrates, Nitrites and *N*-Nitroso-Compounds". It is highly advantageous that almost at the same time an American panel has analyzed the problem thoroughly using the knowledge of eight experts of different disciplines, five consultants and two staff members. All those interested in this very important environmental item may study and compare both publications. The result of the evaluation of the National Academy of Sciences is grouped into 12 chapters and into 4 appendices.

The 12 chapters comprise an executive summary, information about the nitrogen cycle, about the occurrence and transport of nitrates in the environment, about the techniques for the analysis and measurement of critical compounds and processes, about the mass-balance approach and mass-balance studies for nitrogen, about the nitrate pollution (sources and environmental processes linked to excessive nitrate in the environment), about the nitrogen fixation by human activities and perturbations of the stratospheric ozone layer, about the ecological effects of nitrates, nitrite and nitrosamines, about health effects of nitrates, nitrites and *N*-nitroso compounds, about techniques and strategies for the control of nitrates in the environment and about an economic analysis of some issues related to nitrates in the environment, as well as the analysis of some policy issues related to nitrates in the environment.

The four appendices include mass-balance studies for nitrogen, a statistical analysis of some factors associated with cancer mortality including the role of nitrite in diet, a quantitative assessment of the risk of human cancer associated with exposure to nitrates, nitrite and nitrosamines in the environment and research needs (suggested topics).

Each chapter contains valuable information about literature. The scope of the whole study excludes nitrogen, ammoniak and nitrogen oxides which have been assessed separately, and includes impacts of nitrates on human health (including risks for cancer and infant methemoglobinemia), ecological effects of nitrates (including impacts on the (agricultural) ecosystems, on the eutrophication and on toxic effects on plants and animals) and potential depletion of the stratospheric ozone layer. The existence of a 10 mg nitrate/l drinking water standard seems to be a useful policy instrument. 25 to 35 percent of the acidity of rainfall in the eastern United States is derived from nitrates. Unfortunately the volume, which contains detailed information of great value, has no index.

The chapter about analytical chemistry deals with the methods to determinate nitrate and related nitrogen species in water, air and soil. Because of lability of nitrogen species, changes during storage and interference with other matters, manual methods for concentrations below about 0.1 mg N/l of water are tedious and often have poor reproducibility. Nitrite ions can be measured more accurately down to detection limits of 0.001 mg N/l or less, for instance by simple colorimetric methods. Analysis of soil is more complicated because of the heterogenous structure and of the changes. Extraction methods for soil and air are described. Measurements of processes—for instance also in biological research—can be studied with ^{15}N or ^{13}N . Finally, the quantification of denitrification, mineralization of nitrogen, nitrification and nitrogen fixation are discussed.

As mentioned, one appendix deals with research needs. The following topics are mentioned: Potential impacts of nitrogen fixation on the stratospheric ozone layer (with 10 questions), the extent and damages of NO_x contributions to acidity of precipitation (with 13 questions), water quality impacts of human manipulation of the nitrogen cycle (with 13 questions), potential carcinogenic hazards associated with nitrates in the environment (with 5 questions), regional management strategies for nitrate-related environmental problems (with 4 questions) and other research needs (with 3 questions). As far as one can see the volume does not include some secondary effects of nitrates, such as dissolving heavy metals from water pipe-lines.

ERNEST MERIAN

TOXICITY OF HEAVY METALS IN THE ENVIRONMENT, Frederic W. Oehme, Comparative Toxicology Laboratory, Kansas State University, Manhatten, Ka. Two parts: Part 1 (1978) 515 pages; Part 2 (1979) 455

pages. Linen, format 260×185 mm. ISBN 0-8247-6718-7 and -6719-5. Printed by Marcel Dekker, Inc., 270 Madison Avenue, New York, N.Y. 10016. SFr. 106.— each part.

A selection of authors, each with a specific expertise and knowledge, has made an effort to present an overview of the toxicology associated with heavy metal chemicals as they occur in the environment of all animals, including humans. According to the editor the publication serves two functions: To provide a review and discussion of the current information on comparative heavy metal toxicity, and to further demonstrate that comparative studies involving scientists with diverse backgrounds, training, and specialty-disciplines provide a well-balanced forum with which a specific effort can rapidly and accurately arrive at its objective. Some chapters appeared in earlier publications of *Clinical Toxicology*. The two volumes contain 31 chapters with complete literature surveys, and a very valuable index of 18 pages.

The two parts discuss in the beginning and in the end the basic concepts and principles of heavy metal pollution in 10 chapters. They argue how the heavy metals enter the environment and animal or human food chain, and the fundamental principles and mechanisms of toxicity due to heavy metal chemicals. They include an excursion into the area of trace heavy metals and the interactions of specific metallic compounds, as well as a quantitative assay of environmental metallic contaminants and some concepts of chelation therapy. These 10 chapters deal in fact with the persistence versus perseverance, with heavy metals and trace elements in animal and plant foodstuffs, with the mechanisms of heavy metal inorganic toxicities, with the teratogenicity of heavy metals, with interactions of trace elements, with regulatory aspects in the environment, with beneficial aspects of trace elements, with the quantitative analysis for environmental and biological concentrations and with heavy metal antidotes. These chapters contain very valuable information, comparisons, tables and figures, but the literature has only been included up to about 1974.

The chapter "Quantitative Analysis for Environmental and Biological Concentrations of Heavy Metals" of 148 pages was written by Prof. Clifton E. Meloan, Department of Chemistry, Kansas State University, Manhattan, Ka. and is updated until 1974. It contains 102 figures and 23 tables, and it discusses thoroughly flame emission, atomic fluorescence spectroscopy, ARC emission spectroscopy (including detector possibilities), X-ray fluorescence, spark source mass spectrometry, but does not compare these methods and the many technical details with other methods. Neither can too many informations about sample preparation be found.

Some other chapters describe the more common toxic heavy metals together with their biochemistry and clinical syndromes. These chapters contain very interesting and important information with many figures and tables, but the selection and emphasis of the heavy metals described is not very systematic and has been chosen somewhat arbitrarily. Seven chapters deal for instance with lead, one chapter with cadmium, three chapters with organic mercury compounds, two chapters with inorganic and organic arsenicals, four chapters with selenium, one chapter with copper and molybdenum together, one chapter with fluorides, one chapter with beryllium and one chapter only with the lesser metals, such as the alkaline metals, the alkaline earth metals, the rare earths, chromium, manganese, iron, cobalt, nickel, platin-group metals, silver and gold, zinc, boron, aluminum, thallium, germanium, tin, antimony, bismuth and others.

E. MERIAN