

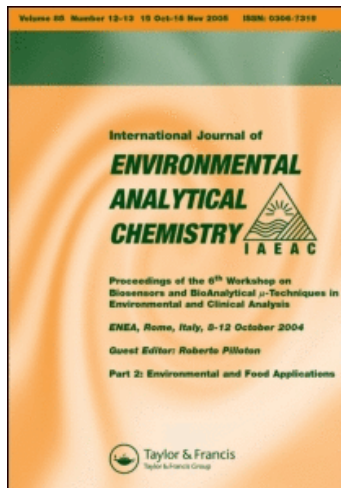
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### Book Reviews

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## Book Reviews

**HANDBOOK ON THE TOXICOLOGY OF METALS** by Lars Friberg (S-10401 Stockholm), Gunnar F. Nordberg (DK-500 Odense) and Velimir B. Vouk (WHO, CH-1211 Geneva), and sponsored by the U.S. Environmental Protection Agency 1979, 709 pages, linen, format 246 × 173 mm ISBN 0-444-80075-1, printed by Elsevier/North-Holland Biomedical Press, Amsterdam NL, \$117.00/Dfl 240.00.

The Handbook on the Toxicology of Metals is a comprehensive review of the biological effects of metals that are relevant for the understanding and evaluation of their toxicity (primarily to man). The book is written mainly for physicians, toxicologists and engineers in the field of environmental occupational health, but any scientist dealing with environmental pollution finds a lot of information.

The well structured approach allows an easy access to data and pertinent analysis of major topics in the field. The book starts with a list of 27 contributors (including addresses) and a list of 24 reviewers, followed by the table of content. The first part of 272 pages deals with 14 general aspects, such as the chemistry, the distribution, the routes of exposures and the effects of metals in general. The second part of 413 pages comprises 28 chapters, each dealing in the alphabetical order with a specific metal. The chapters are self-contained (each includes a valuable literature review, partly up to 1976/1977, and partly up to 1979), but cross references are provided from one chapter to another. The book concludes with a subject index of 23 pages.

The 28 chapters dealing with specific metals adhere to a common format, which means that the reader will find the same type of information for each metal in the same order. Each chapter is therefore composed of 8-10 subchapters: An abstract, the physical and chemical properties, the methods and problems of analysis, the production and uses, the environmental levels and exposures, the metabolisms, the levels in tissues and biological fluids, the local and systematic effects, the dose-response relationships and diagnosis, prognosis and treatment.

The analytical chemist finds the chapter "Sampling and Analytical Methods" of 13 pages in the general part and the heading "Methods and Problems of Analysis" in each element-chapter. The information given is rather general, to get an understanding for the non-chemist users of the book. Not too much is said about the critical limitations in sampling, about the advantages and disadvantages of the different methods (including detection limits, accuracy, influences of matrix) and about the differentiation between different physical and chemical forms of the metals. One misses also critical metal-oriented descriptions and evaluations of biological analytical methods, such as enzymatic determinations and testing for mutagenicity (where there are special problems in the evaluation of metals and their derivatives).

The handbook contains a great deal of valuable informations in a well structured form. It is primarily oriented to human toxicology, and one does not find many informations about impacts on the environment and about effects on plants and animals (such as for instance fishes, and other soil and water organisms). Most of the chapters are very up to date, but in some chapters—such as the one about "Lead" (which concludes at 1976/1977 already)—the reader would expect a more critical evaluation of the distribution and the interactions in the environment and of the side-effects according to the newest scientific knowledge. In many cases it would have been better to differentiate more critically and more systematically between different chemical and physical forms of metals, when effects are discussed. One misses also some conclusions or recommendations for specific standards or health criteria, also in view of the different behaviour of some populations and individuals.

On the other side, the hurried reader finds excellent rapid first information in the well written abstracts of each chapter. The subchapters about metabolism and about carcinogenic, mutagenic and teratogenic effects of each metal give an excellent overview, especially as they are often not treated in the systematic way in other publications on metals. Another advantage is the lot of information given about interactions between metals, which is often forgotten in other reviews.

ERNEST MERIAN

**WASTE TREATMENT AND UTILIZATION** (Theory and Practice of Waste Management) by Murray Moo-Young and Grahame J. Farquhar, University of Waterloo, Ontario, Canada; 574 pages, 211 illustrations and 513 literature references, linen, format 256 × 182 mm, ISBN 0-08-023831-9, printed by Pergamon Press Ltd., Oxford OX3 0BW, England 1979, US\$ 70.00 or £32.00

The proceedings of the International Symposium held at the University of Waterloo, Ontario, Canada in July 1978 review current knowledge and evaluate new developments in the theory and practice of waste management. The symposium is emphasizing on a general, multidisciplinary and integrative view of the subject. An approach to waste management becomes increasingly more imperative as cross-pollution effects and resource recycling interactions increase. 45 known experts in their field have covered in 38 technical papers and in 7 abstracts physical, chemical and biological aspects of waste management of solids, liquids and gases. Waste sources include the chemical, petrochemical, mining, metallurgical, food and agricultural industries as well as mixed municipal sources. Extensive literature references are included. The last 9 pages of the book contain the list of conference participants, the author index and the subject index, which is, however, of limited value.

The valuable monograph is structured into six sections (each covered by 5 to 10 papers):

- Background Overview
- Physicochemical Treatment of Liquid Inorganic Wastes
- Physicochemical Treatment of Liquid Organic Wastes
- Non-biological Methods of Solid Waste Management
- Biological Waste Treatment and Utilization
- Air Pollution Control.

22 Canadian, 7 United States, 3 United Kingdom, 2 Japanese, 2 Nigerian and one Danish, one German, one Indian, one Indonesian, one Malaysian, one Swedish, one Thai and one Singaporean scientists or engineer each—and their co-authors—were responsible for the 45 papers.

Economic factors and possibilities to reutilize wastes are also discussed. Quite a few papers deal with the reclamation of metals (and their compounds), such as copper, nickel, zinc, tin, vanadium, magnesium compounds, uranium, chromic acid and gold mill effluents (cyanides!). Other fields are asbestos, plastic wastes, effluents of the cellulose, paper and board industry, chemical waste and cementitious products, phenols, the toxicity of surfactants and emulsified oil-water. Biological waste treatment is carefully analysed, including the production of biogas and other uses of agricultural wastes (such as conversion to feed supplement). A few papers deal with air pollution control, for instance prediction models, reduction and removal of  $\text{SO}_2$  and the use of a specially developed scrubber.

It is suggested that the material is mainly of interest to researchers and practitioners of waste management and in education. The whole volume is

in principal restricted to industrial wastes, and is therefore of main value to engineers dealing with pollution control, waste treatment and by-products recovery, as well as to government regulatory bodies and laboratories, and operators of municipal waste treatment facilities. The volume is not dealing with analytical chemistry, gives however some information about the occurrence and distribution of some critical pollutants in waste and in the environment.

ERNEST MERIAN

**ANALYTICAL TECHNIQUES IN ENVIRONMENTAL CHEMISTRY** by Dr. Joan Albaigés *et al.*, Environmental Chemistry Unit, Institute of Bio-Organic Chemistry (CSIR), Barcelona, Spain; 658 pages, 267 illustrations and over 1000 references, linen, format 256 × 182 mm, ISBN 0-08-023809-2, printed by Pergamon Press Ltd., Oxford OX3 0BW, England 1980, US\$85.00 or £37.50

The proceedings of the International Congress of November 1978 in Barcelona include 60 (practically all) papers presented. The meeting was organized by the Societat Catalana de Ciències Físiques, Químiques y Matemàtiques—which deals with a better knowledge of our environment—and Expoquímia (who organized an International Chemical Exhibition). The book covers therefore recent advances on new methodologies, analytical instrumentation and monitoring strategies for the determination of organic and inorganic compounds in the environment. Special emphasis is given to the problems of detection and measurement of specific pollutants in atmospheric emissions, raw and marine water, industrial effluents and biological samples. Hydrocarbons (especially PNA = Polynuclear Aromatics), organochlorinated compounds and toxic metals are extensively considered and natural products are covered. The application of both well-established and new analytical techniques are included. At the end of the volume an index of 10 pages is included, which contains mixed references to authors and to subjects.

20 United States, 7 United Kingdom, 5 French, 5 German, 5 Spanish, 5 Italian, 3 Canadian, 2 Swiss, 2 Belgian, 2 Dutch, 1 Austrian, 1 Japanese, 1 Turkish and 1 Yugoslavian scientists and their co-authors were responsible for the 60 high-standard papers.

Main emphasis was given to water pollution (including sediments and water organisms), which is covered by 34 papers, the rest dealing with the analytical chemistry of air pollutants, soil, biologic materials, and general and miscellaneous problems. On the other side one finds 37 papers devoted

to organic pollutants and 23 papers to inorganic pollutants (elements). Quite a few of the papers on organic pollutants deal with polycyclic aromatic hydrocarbons and with halogenated organic compounds (such as PCB's and TCDD's) in the environment. Of special value for industrial monitoring may be papers among others about the quantitative analysis of methyl chloride in the atmosphere, and about gas chromatographic—mass spectrometric studies on styrene toxicity.

The reader finds many informations about analytical methodologies (including sampling) in the 60 papers, some may be more specific, others are of more general applicability. The analytical chemistry of organic pollutants uses gas chromatography, liquid chromatography and thin layer chromatography in combination with mass-spectroscopy and/or various detector-systems. For the detection and quantification of heavy metals and elements X-ray fluorescence, X-ray emission, ion-selective electrodes and electrochemical methods are mainly used, apart from neutron activation and atom absorption in specific cases. Some papers deal also with environmental chemistry and with general remarks about monitoring and effects (biological reactions, carcinogenicity, mutagenicity, political conclusions, priorities and general analytical chemistry).

ERNEST MERIAN

**AN INTRODUCTION TO MICROSCOPY BY MEANS OF LIGHT, ELECTRONS, X-RAYS, OR ULTRASOUND** by Theodore George Rochow (North Carolina State University, Raleigh, N.C., U.S.A.) and Eugene George Rochow (Harvard University, Cambridge, Mass., U.S.A.), 367 pages, numerous figures and several tables, linen, format 226 × 152 mm, ISBN 0-306-31111-9, published by Plenum Press, 227 West 17th Street, New York 1978, £18.58

On the cover the introduction statement reads: "The first book to deal with *all* aspects of microscopy in one volume, this all new work presents not only classical optical microscopy but also the extension of microscopical concepts and procedures to the use of electrons, ions, X-rays and ultrasonic waves for studying biological, mineral, and synthetic materials".

This is certainly a large and important goal. Unfortunately its realization is only partially satisfactory: Out of 367 pages with a large number of figures and micrographs of good quality more than 200 pages are devoted to light microscopy. Only about 20 to 30 pages are devoted to each chapter on transmission and scanning electronmicroscopy although these techniques provide tremendous capabilities and their physi-

cal principles and analytical information obtainable are certainly less known as compared to light microscopy.

The book further contains short treatments of the (less common) methods of field-ion, X-ray- and ultra-sonic-microscopy. The very important modern field of secondary ion microscopy however is not dealt with at all.

From the viewpoint of an analytical chemist to whom imaging of a material is only a small part of its characterization it is another severe lack of this book that in the chapters on transmission and scanning electron microscopy techniques which deliver chemical informations such as X-ray microanalysis, electron-diffraction or energy-loss-spectroscopy are not dealt with.

However in general this book is of value to students and persons engaged in practical materials characterization work. To those it may serve as a good introduction, mainly to light microscopy.

MANFRED GRASSERBAUER