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### Book Reviews

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## Book Reviews

GLOSSARY ON AIR POLLUTION, WHO Regional Publications European Series No. 9 (Director, Promotion of Environmental Health, WHO Regional Office for Europe, Scherfigsvej 8, DK-2100 Copenhagen Ø) 1980, 114 pages (including an introduction, a list of reviewers and a list of the sources of definitions), stiff paper cover, format 239 × 159 mm, ISBN 92-9020-109-6, WHO Health and Biomedical Information Programme, CH-1211 Geneva 27, SFr. 12.

The glossary gives definitions for over 600 terms, used in the air pollution literature, and which come from a wide range of disciplines, particularly chemistry (analytical, inorganic and physical), meteorology, physics and numerous branches of engineering and technology. All too frequently, terms that may appear to be commonly known are in fact not known with their correct meanings; such terms are consequently used incorrectly and interdisciplinary communication is hindered. The definitions—which should help as a contribution to greater understanding—are largely in accordance with those of the International Union of Pure and Applied Chemistry (IUPAC), or are quoted from standard vocabularies published for instance by the International Commission of Radiation Units and Measurements, by the International Electrotechnical Commission, by the International Organization for Standardization, by the Organisation internationale de Métrologie légale, and by the Meteorological Organization. Some terms are just based on prevailing international usage. The valuable edition is thought to be regarded as provisional, and the users are invited to make suggestions for modifications, corrections, or additions.

Several definitions are included, which are of especial importance when dealing with environmental analytical chemistry.

ERNEST MERIAN

Spektroskopische Methoden in der Organischen Chemie (in German), by Manfred Hesse, Herbert Meier and Bernd Zeeh, 478 pages, including 169 figures and 86 tables, flexible paper cover,

ISBN 3-13-576101-0, Georg Thieme Verlag, Stuttgart 1979, price DM 26.80.

The combined application of spectroscopic methods in structure elucidation and synthesis control is today a routine technique in organic chemistry and corresponding courses are integrated into the curricula all over the world. Since structural information as available from different methods is partly overlapping and partly complementary, the combination of these techniques leads to an enormous increase of their power. Although this is a well known fact, the corresponding courses are separated in remarkably many universities. Correspondingly low is the number of text books dealing with a joined use of the most important spectroscopic methods.

This volume contains an introduction into the UV/VIS spectroscopy (by H. Meier), IR and Raman spectroscopy (by B. Zeeh), NMR spectroscopy (by H. Meier) and mass spectrometry (by M. Hesse). In addition a few problems demonstrate the combined application of these methods (by M. Hesse).

The chapter on UV/VIS spectroscopy describes, besides theoretical backgrounds and practical aspects, the most important chromophores. At the end of this short chapter the principle of chiroptical methods is also discussed. The next part contains an introduction to infrared spectroscopy, the description of IR spectrometers, sample preparation techniques and tables of the most important group frequencies. According to its lesser practical importance in routine work the Raman spectroscopy is only briefly discussed. The chapter on NMR spectroscopy begins with the discussion of the most important parameters: chemical shift, coupling constants, line width and line intensity. Then the influence of molecular symmetry and fast conformational mobility on the isochronicity and magnetic equivalence are discussed. Subsequent parts discuss the special features of proton and carbon-13 NMR spectroscopy and provide reference data for the interpretation of spectra. At the end of this chapter the NMR of some other nuclei is briefly discussed. The presentation of mass spectrometry is perhaps the clearest part of this volume. A brief introduction is followed by a lucid description of the most important fragmentation reactions of organic molecules. Further parts include the discussion of thermal reactions in the mass spectrometer, spectra of impurities, isotopic labelling and other special techniques. The last part of this chapter includes correlation tables and reference data. The short last chapter demonstrates the solution of a few problems by combined application of the techniques discussed in this volume, with strong emphasis of the mass spectrometric information.

All together this book gives the opportunity to acquire a sound basis for all the methods discussed. It offers a good selection of sources for further readings which may help users interested in special topics. Although a fair amount of reference data is included, they will not be sufficient for everyday practical requirements.

E. PRETSCH

ANALYSIS OF POLYCYCLIC AROMATIC HYDROCARBONS IN ENVIRONMENTAL SAMPLES, World Health Organisation/International Agency for Research on Cancer, IARC Publication No. 29 (Series: Environmental Carcinogens, Selected Methods of Analysis, Volume 3, edited by H. Egan, Laboratory of the Government Chemist, London, U.K. et al.) 1980, 240 pages (including 17 figures, 18 tables, many formulae, an annex with 8 methods of analysis and 29 pages of valuable references in two sections), linen, format 242 × 186 mm, ISBN 92-8-321129-4, WHO Health and Biomedical Information Programme, CH-1211 Geneva 27, US\$30 or SFr. 50.

After Volume 1 (1978) "Analysis of Nitrosamines" and Volume 2 (1978) "Analysis of Vilylchloride", this third volume deals with the analysis of a group of compounds, which reflect better than others the historic aspect of environmental carcinogens, and the many problems pertaining to human exposure; which remain to be solved, because of their resistance in our personal, ambient and working environment. The role and significance of most of the individual compounds are still to be fully evaluated. Benzo(a)pyrene concentration is often selected for measurement—not merely because of the known carcinogenic properties of the compound—but because benzo(a)pyrene may indicate the presence of a mixture of PAH-compounds, which together represent a recognized or potential risk. Benzo(a)pyrene is considered to be an indicator, but is not necessarily the major component. Maximal allowable concentrations (MAC) for benzo(a)pyrene are discussed on page 7.

The volume starts with a review by L. Gričiute, Lyon, on the carcinogenicity of the polycyclic aromatic hydrocarbons, and of their occurrence. Because nomenclature has always presented a difficulty for those working with this group of compounds—and so to avoid any confusion—a chapter by J. Jacob and G. Grimmer, Hamburg, with the rules formulated by IUPAC and a list of the most important compounds with their approved nomenclature and formulae has been included. Two other chapters by G. Grimmer, Hamburg, deal with the sources, the occurrence and the distribution of these compounds in environmental samples.

The five following chapters are concerned with the analysis of polycyclic aromatic hydrocarbons: "Sampling" by E. A. Walker and M. Castegnaro, Lyon; "Collection of Airborne Particulate Matter for Analysis of Polycyclic Aromatic Hydrocarbons" by M. Katz, Downsview, Ontario, Canada; "Solvents: Purity and Purification" by E. A. Walker, Lyon; "Extraction and Enrichment of Polycyclic Aromatic Hydrocarbons from Environmental Matter" by J. Jacob and G. Grimmer, Hamburg; "Separation, Detection and Identification of Polycyclic Aromatic Hydrocarbons" by H. Kunte, Mainz.

Eight methods for analysis, applicable to different environmental samples have been selected by an Expert Review Board working closely with the main Editorial Board (Chairman: H. Egan, London) for the Manual. They relate to individual compounds, or selected groups of compounds, and are aimed at practical separations, identifications and estimations at actual environmental levels. Methods of analysis in water and sewage—using thin layer chromatography and spectrofluorometry—and for profile analysis in exhaust gas condensates, in lubricating oil, cutting oil and fuel, in high protein foods, fats, vegetable oils, paints and in soils and sewage sludge—using gas chromatography—are critically described in all details. Four other methods deal with analysis of benzo(a)pyrene and other specific polycyclic aromatic hydrocarbons in food (with UV-spectrophotometry) and of polycyclic aromatic hydrocarbons in atmospheric suspended particulate matter (with extraction procedures and determination by spectroluminescence or quasi-linear luminescence). Of course, also in these cases the samples have to be extracted with selected organic solvents, and then to be cleaned and/or separated with thin layer chromatography.

ERNEST MERIAN

**TOXIC METALS AND THEIR ANALYSIS** by Eleanor Berman, Cook County Hospital, Chicago, Illinois, U.S.A., 304 pages (including an index of 5 pages, 29 tables and 5 figures), linen, format 241 × 163 mm, ISBN 0-85501-468-7, published 1980 by Heyden International Topics in Science, Spectrum House, Hillview Gardens, London NW4 2JQ, U.K., prices £12, US\$27 or DM 56.

The book can be highly recommended to toxicologists, analysts and all those involved in clinical chemistry, since it gives practical information on cases occurring in hospitals. The volume contains more than 1750 literature references (added to each chapter) and an appendix, which presents workable methods for atomic absorption analysis as used in the author's laboratory.

A great effort was taken to establish what may be normal concentrations in biological materials—for instance in different body fluids and tissues from different organs—and what may be toxic. With this clear delineation and a better knowledge, toxicologists can make better use of the important advances in analytical instrumentation and their subsequent application in developing refined, sensitive, specific, and accurate techniques for trace metal determinations. But also the analyst can profit in applying the best methods in relevant concentrations, when he has a better understanding of biochemical roles, distributions in the body and interactions.

Keeping this goal in mind, the structuring of the book is very logical. Dr. Berman first discusses the general history of development of understanding of the roles of different metals in health and disease, and of trace metal analysis. The following 31 chapters deal with the individual metals and metalloids, from aluminium to zirconium, to which toxic properties have been ascribed. The book concludes with an Appendix outlining routine analytical procedures of atomic absorption spectrometry, by giving information about chemical pretreatment of some matrices, and about methods to determine the individual metal concentrations in blood, serum, semen, urine and tissues (including calibration procedures, reagents, working standards). Many metals are first chelated in solution and then extracted, before—for instance—graphite furnace atomisation, comparing standards and unknowns at described resonance lines.

The individual chapters dealing with the 31 elements give some historical information and indications about sources and uses, before the toxicology (abnormal concentrations, biochemical role, distribution in the body, concentration in the diets) and the methods available for the analysis are discussed in more detail. However, as far as intake, mainly oral intake, is treated, and the dispersion of the metals in the environment and the risk assessment of these contaminations are practically forgotten. For instance little is said about lead intake from traffic and changes in the lungs and in the central nervous system, and cadmium intake from incineration, respectively from vegetables cultivated on contaminated areas. The most important headings "Analysis" give very good comparisons of the possibilities in applying colorimetry, fluorimetry, chromatography, polarography, emission spectroscopy, atomic absorption spectrometry, flameless atomic absorption, X-ray spectroscopy, X-ray fluorescence and neutron activation analysis. Here one finds valuable practical indications (very useful literature references) to select the best method in view of the detection limits desired.

ERNEST MERIAN