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### Book Reviews

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## Book Reviews

PHYSICAL AND CHEMICAL CHARACTERIZATION OF INDIVIDUAL AIRBORNE PARTICULATES (Analytical Chemistry Series), by Dr Kvetoslav Rudolf Spurni, Fraunhofer-Institute D-5948 Schmallenberg, 418 pages [including 217 figures, 37 tables, newest literature references (up to 1985!) added to each chapter, and an index of 6 pages], hard cover, format 247 × 174 mm, ISBN 0-85312-793-X, Ellis Horwood Limited, Chichester, West Sussex PO19 1EB (1986), £55.

To understand bioavailability it is of real importance to characterize individual airborne particles and to learn how chemical substances are distributed in them. Only in the 1950's the ideas of single-particle and droplet analysis and identifications started to be realized. Intensive developments in the field of aerosol and colloid analysis started in the earlier 1970's. In the 1980's new equipment based on physical, nuclear and computer-based methods for chemical analysis allowed to make further progress. The monography has thus been published at the right moment for all those interested in separation, analysis and identification of single particles in the  $\mu\text{m}$  or sub- $\mu\text{m}$  size ranges. Two newer steps in this development of methods are especially important and discussed: the observation of chemical composition of particles by combining an aerosol beam system with mass spectrometry (the author mentions especially the pioneers H. Straubel and S. K. Friedländer). Twenty-two contributors from the Federal Republic of Germany, the USA, Belgium and Austria wrote the 21 chapters: Of general and basic interest are the first four chapters on

- Environmental and Biological Disperse Systems (not much information is however found on biological systems, such as cells)
- Physical Characterization of Single Particles and Particle Collectives

- Sampling Methods and Sample Preparation (it is however not clear why for instance diffusion denuders (and for instances the scientific work of D. Klockow) are not mentioned)
- Single-particle Deposition in Human Airways.

Specific methods are described in more detail in Chapters 5 to 20 discussing light scattering, chemical identification, electro-optical measurement of charges, microscopy, particles and fibres in human lungs, laser microprobe mass spectroscopy [among other applications particulate pollutants from automobile exhausts (PbBrCl) are studied], particle-induced X-ray emission analysis, secondary ion-mass-spectrometry, X-ray photoelectron spectroscopy, and analytical aerosol chemistry. Although the volume gives an excellent overview (some conclusions are drawn by K. R. Spurny in the 21st chapter "Review of Applications"), it was often not possible to go within the limited space into (practical) details: One finds—somewhat arbitrarily—some indications on topochemical techniques to study airborne lead and on X-ray photoelectron spectroscopy to differentiate between chromium species, but one misses for instance the subjects "hydrocarbons", "polyaromatic hydrocarbons" (carcinogenic organic pollutants are mentioned with the possibility to be absorbed on asbestos fibres), "Diesel exhaust", "nickel species" (the characterization of them is critical for carcinogenicity), and "fog" (in these droplets pollutants may be concentrated: important mechanisms).

**HANDBOOK ON PRACTICAL ESTUARINE CHEMISTRY**, edited by P. C. Head, North West Authorities, Warrington, UK, 337 pages [including 61 figures, 31 tables, (not very new), references added to each chapter, and a subject index of 7 pages], hard cover, format 235 × 158 mm, ISBN 0-521-30165-3, Cambridge University Press, Cambridge CB2 1RP, UK (1985), £25, US\$ 54.50.

The handbook is written by six experts from the UK, from Sweden and from Monaco. It is said to be the second volume of a series [the first one (1979) studied physical aspects of estuaries, the third one (in preparation) will deal with estuarine biology] sponsored by the Estuarine and Brackish-Water Science Association. The book is intended as an introduction to the techniques currently used to collect and interpret chemical data from estuaries, written at a level

suitable for readers without an extensive knowledge of chemistry. Information is mainly drawn from within the United Kingdom. In fact important scientific contributions (for instance by J. Albaiges, U. Förstner, L. Mart, H. W. Nürnberg, or W. Salomons) are not even mentioned among the literature references. The handy volume is structured into seven chapters:

- Estuarine Chemistry and General Survey Strategy
- Operations in the Field (dealing mainly with sampling)
- Salinity, Dissolved Oxygen and Nutrients (measurement of these parameters)
- Trace-Element Analysis (a well balanced short chapter, mentioning also in a limited way speciation, but besides three references all the literature presented is older than 1982)
- Analysis: Organic Matter (mainly measuring of total dissolved organic carbon by oxidation, of particulate organic matter by filtering and combustion, and of particulate organic nitrogen by Dumas or Kjeldahl combustion are described; only five pages are reserved for the analysis for anthropogenic compounds; although petroleum-hydrocarbons and PCB's are mentioned shortly, one should add more concrete information in a new edition, and also include for instance "humic substances", "chloroform", or "trichloro-ethylene" into the index)
- Ion-selective Electrodes in Estuarine Analysis (with the physico-chemical basis)
- Data Presentation and Interpretation (incl. effects of variations).

**FISH PHYSIOLOGY: RECENT ADVANCES**, edited by Prof. Stefan Nilsson and Prof. Susanne Holmgren, University of S-400031 Göteborg, 198 pages (including 36 figures, 16 tables, newest references added to each chapter, and an index of  $2\frac{1}{2}$  pages, which is not very representative), linen, format  $223 \times 143$  mm, ISBN 0-7099-1837-2, Croom-Helm Ltd, Beckenham, Kent BR3 1AT, UK (1986), £27.50.

The handy booklet was the result of the Fourth Symposium on Fish Physiology, held at Göteborg in August 1985, and the contributors come mainly from Sweden, but also from the UK, Denmark, the USA, New Zealand and the Federal Republic of Germany. The number of extant fish species has been estimated to be in excess of

20 000, and only relatively few of these have been subject to physiological studies. Many physiological systems are different from those of the land-dwelling vertebrates. Physiological research is of vital importance in two directions: fish culture and environmental toxicology. The booklet focuses on five major areas of basic and applied research: haemopoiesis (production of new blood cells), acid-based regulation, circulation, gastro-intestinal functions and physiological toxicology. Professor G. Dave, S-400 31 Göteborg states that toxicologists—in hazard assessment—are brought face to face with the problems of extrapolating from short-term tests to long-term exposure, and from a limited number of species to the majority of species (contradictory to human toxicology, where extrapolations from several animal species are made to the one species man).

One finds information in 11 chapters (physiology of haemopoiesis, mechanisms and limitations of fish acid-base, physiological investigations of marlin, fish cardiology, control of gill blood flow, exercise (e.g. swimming performance, cardiovascular control), gastro-intestinal peptides in fish (e.g. nervous systems, enzymes, immunoreactivity), rates of food processing in fish, filtration in the perfused hagfish glomerulus, physiological laboratory and field studies (e.g. cadmium toxicology), and toxicity testing procedures. Interestingly enough the terms “carcinogenicity”, “lead” (mentioned on pages 162 and 173), and “organophosphorus compounds” are missing in the index.

**SPECIFICATIONS FOR PESTICIDES USED IN PUBLIC HEALTH, SIXTH EDITION**, 384 pages [4 figures, 1 table, practically no literature references, no index (perhaps not necessary for this type of information because there is a good list of contents), but an annex of 4 pages with common and chemical names], paper board, format 240 × 160 mm, ISBN 92-4-156084-3, World Health Organization, CH-1211 Geneva 27, Switzerland (1985), Swiss Fr. 48.

Since the fifth edition (1979) a WHO Expert Committee on Vector Biology and Control (1983) started to bring the specifications up to date. Especially modern techniques such as gas-liquid chromatography and high-performance liquid chromatography have been introduced in place of older analytical techniques. A goal was also

to standardize equipment and operating conditions, and thus sampling and test procedures are presented according to the present state of the art on 36 pages. But most of the volume deals in a comparable way with the specification (including packing) and methods of determining chemical and physical properties of three chlorinated organic compounds, of pyrethrum, of eleven organophosphorus compounds, of one carbamide, and of five compounds from various classes in technical form, as a water-dispersible powder, and as an emulsifiable concentrate. One thus finds pertinent information on handling the most important insecticides, molluscicides and repellents. Emphasis is however laid on avoidance of intoxications, and not really on the avoidance of accidents. Recommendations are made for each product regarding packing and marking of packages, and for instance how to control heat stability, but not regarding storing. In the case of Malathion it is said, that it should be stored in a cool place, and to use it as soon as possible to avoid decomposition. Regarding flashpoint it is normally stressed that it should comply with all national and/or international transport regulations. In the specific case of Temephos it is added that the flashpoint of the concentrate should not be lower than 38 °C.

#### ANALYTICAL PROBLEMS, TOPICS IN CURRENT CHEMISTRY Nr. 134, with 3 contributions:

- Surface Enhanced Raman Scattering of Biomolecules, by Eckhard Koglin and Jean-Marie Séquaris, Nuclear Research Center (KFA), D-5170 Jülich 1
- Sampling and Sample Preparation of Environmental Material, by Richard G. Melcher, Thomas L. Peters, and Herbert W. Emmel, The Dow Chemical Company, Midland, Michigan, USA
- Chemical Reactions in Alkali Metals, by Hans Ulrich Borgstedt, Nuclear Research Center, D-7500 Karlsruhe

163 pages [including 58 figures, 16 tables, references added to the three chapters, and an author index of 6 pages for the Volumes Nr. 101–134 (but no subject index)], linen, format 248 × 171 mm, ISBN 3-540-16403-0, Springer-Verlag, Berlin, Heidelberg, New York, Tokyo (1986), DM. 124.

The first chapter deals especially with new spectroscopic methods for characterizing *in situ* the chemical identity, structure, orientation, chemical and electrochemical reaction of biological specimens adsorbed at charged metal surfaces. SERS- and SERRS spectroscopy are indeed very powerful down to  $10^{-8}$  M. In the third chapter problems of safe handling are discussed, as well as reactions of alkali oxides, alkali-carbon compounds, alkali metals–nitrogen compounds, and alkali hydrides, concluding with information on the miscibility of alkali metals with metallic elements in the liquid state. Of special importance to the environmental analytical chemist is of course Chapter 2 (most of the literature references are however rather old). Within 65 printed pages only, it was also just possible to present an overview. The authors stressed the importance of a good communication between toxicologists (who use data), the field researchers, and the analytical chemists. The purpose of a monitoring project must be thoroughly understood, to ensure that the proper samples are taken and their integrity maintained (analysis at the time of collection is seldom possible, so the samples must be transported and stored). The chapter is structured into six sub-chapters:

- Whole-Air Sampling, Sampling with Concentration, and Detector Tubes of/for Gases and Vapours in Air
- Sampling of Particulates in Air (some information is presented about filters, impingers, cyclones, and elutriators; but one misses newer developments related to lung passable aerosols and to mist, for instance also the application of denuder tubes for separation by diffusion)
- Preparation of Water Samples for Analysis (one finds only a few ideas regarding solid–liquid-extraction for instance, and the sub-chapter is just too short to be of great value)
- Preparation of Solid Samples for Analysis (Soil, Sediment, etc.)
- Treatment of Water and Solid Sample Extracts
- Sampling Water and Solids (including Sediments, Sludge; in this subchapter some useful warnings are presented).

The Chapter thus is a useful first introduction for students and for users of analytical data, to give them interdisciplinary ideas to be thought over. An analytical chemist may however not find too much concrete advice.

DRINKING WATER AND HEALTH, Volume 6, by a Committee under the Chairmanship of Daniel B. Menzel, Duke University Medical Center, Durham, North Carolina, USA, 457 pages (including 22 figures, 45 tables, references added to each chapter, 4 pages with Committee biographies, and an index of 15 pages), paper board, format 229 × 153 mm, ISBN 0-309-03687-9, National Academy Press, National Research Council, Washington D.C. 20418, USA (1986), £27.40 (available from John Wiley & Sons Ltd, Chichester, West Sussex PO19 1UD, England)

Since 1977 committees have identified health effects associated with specified contaminants, areas of insufficient knowledge, and recommendations for future research. Toxicological data and estimates of risks are thus reviewed. In this newest addition to the series in the immediate interest to E.P.A. 14 specific compounds found in drinking water were assessed: acrylamide, carbamate pesticides, aldicarb, diallate, sulfallate, dibromochloropropane, chloropropanes and chloropropenes, di(2-ethylhexyl)phthalate, mono(2-ethylhexyl)-phthalate, ethylene dibromide, nitrofen, pentachlorophenol, and trichlofon. But the general references are useful in many fields of toxicology and public health. After an Executive Summary the volume is structured into the seven chapters:

- Developmental Effects of Chemical Contaminants (with discussion of the influence of time of exposure, and of interpretation of animal data)
- Reproductive Toxicology (maturation, sperm production and motility, fertility)
- Neurotoxic Effects (nervous systems in health and disease, animals and humans)
- Mechanisms of Carcinogens (including genetic toxicity, multistage models, animal bioassays and short-term tests, and influences of the immune system)
- Dose-route Extrapolations: Using Inhalation Toxicity Data to set Drinking Water Limits (including pharmacokinetic models and interspecies extrapolation)
- Data on Humans: Clinical and Epidemiological Studies (including limitations)
- Risk Assessment (with critical interpretations of no effect levels; it is explained that quantitative risk assessment includes four distinct



components: hazard identification, exposure assessment, dose-response assessment, and characterization of human risk at projected levels and patterns of exposure).

(BELGIAN RESEARCH ON) METAL CYCLING IN THE ENVIRONMENT, edited by D. Rondia, University of B-4000 Liège, 437 pages (including 127 tables, 125 figures, literature references added to each presentation, an author index of 2 pages, and a subject index of 5 pages), paper board, format 238 × 174 mm, ISBN 2-87014-162-9, Presses universitaires de Liège, Belgium (1986), Belgian Francs 600.

The book of international interest (because of its informative level, and as a model for other countries) contains the full text of 42 contributions presented by Belgian scientists at a symposium held in Brussels, October 11–12, 1985, and organized by the Belgian SCOPE Committee on environmental pollution by metals. The publication is structured into the six sections:

- Metals in the Atmosphere (with significant information on monitoring and characterization (or particulates), and on sources, transports and fates)
- Metals in Water (discussing also speciation, transformations and accumulation)
- Metals in Soils and Plants (including discussion of speciation and transfer)
- Metal Toxicity to Plants (enzymes as biological criteria, and physiological responses of higher plants)
- Metal Transfer to Man (especially transfer of lead was studied, but also in a more general way the distribution of other elements in lung segments and their “filtering” by cows, so that meat and milk contain less metals)
- Metal Toxicity to Man (transfer of cadmium to a general urban population and psychometrical performance of Belgian children exposed to lead, as well as studies on the genotoxicity of metal compounds (including mercury compounds) are the three main subjects discussed).

As a non-destructive analytical technique to study sampled filters,

X-ray fluorescence is, for instance, used. Especially atmospheric transport of antimony (by Br. Vanderborcht *et al.* and by K. de Docker *et al.*), mercury, cadmium, zinc, and platinum (by W. Maenhaut) from industrial sources is discussed in detail. As far as waters the contributions of riverine, atmospheric and sedimentary inputs to coastal waters, sequestration in river sediments, and the differentiation between dissolved species and suspended matter are studied. Of interest are also releases from soils and sewage sludges and transports in soil solutions.

ERNEST MERIAN