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BOOK REVIEWS

Chemical Events in the Atmosphere and their Impact on the Environment, Proceedings of a Study Week and the Pontifical Academy of Sciences, 7–11 November, 1983, edited by G. B. MARINI–BETTÓLO, Studies in Environmental Science, 26, Elsevier 1986, 702 pages, price: US $ 164.75, ISBN 0-444-99513-7.

The book is divided into 5 parts:

1. Structure, components and primary processes in the atmosphere.
2. Atmosphere and the secondary processes: the effect of geological and anthropic components.
3. The effects of chemical reactions in the atmosphere on the environment.
4. The effects of chemical events in the atmosphere on life.
5. Final considerations and conclusions.

Each part contains a few well-written papers followed by discussions. The most recent scientific findings have been presented in the context of broad knowledge of chemistry and physics of the atmosphere. Discussion on an impact of chemical reactions occurring in the atmosphere on the biosphere is of special importance.

In the conclusion the editor, Marini-Bettólo, has stated: *We recognize, however, that the global system is an entire whole, and that no one body of knowledge can allow us to use if safely. Nature does not recognize the scientific disciplines into which we have divided scholarship. It is imperative that we seek to use chemical knowledge with as full understanding of the global system as we can command. We recognize, too, that science should not and cannot dictate the manner in which humanity solves its problems. We can offer help, advice and the technical means. Objectives remain the choice of our entire society.*

These few sentences summarize well a philosophy of the book. Surely the book is very valuable, not only as a source of information, but also as a guide which helps to understand processes occurring in the atmosphere.

Since the book is clearly written, it is understandable not only for chemists but also for other scientists as well as for students. It is one of the best books on chemistry of atmosphere the reviewer ever had in hand. I think that it would be worthwile to carry out a similar study on reactions occurring in water environment and to prepare a similar book on that topic.

Lucjan Pawłowski

Ion Exchange Resin by ROBERT KUNIN, edited by Robert E. Krieger Publishing Company, Malabar, Florida, 1985, 526 pages, price: US $ 36.25, ISBN 0-89 874-837-2.

Ion exchange is widely used for water treatment. During the last decade many attempts, some of them very successful, have been made to apply ion exchange for wastewater treatment and even for purification of gases.

The book by KUNIN surely provides solid information on practical aspect of ion exchange. In consists of 17 chapters. In the first chapter the author presents a short history of ion exchange. The second chapter is devoted to the theory and mechanisms of ion exchange. It is written clearly and provides basic and sufficient knowledge for technologists. Characteristics of ion exchange resins is presented in chapter 3 (cation exchanger) and chapter 4 (anion exchanger). Some basic information on synthesis of the ion exchange resins is presented in chapter 5. Although, this chapter does not depict state-of-the-art of synthesis, it is valuable as helps to understand nature of the ion exchanger resins. In chapters 6–14 author discusses various practical aspects of application of ion exchange in water treatment, hydrometallurgy, purification of some products (e.g., sugar, glycerine), catalysis, and analytical chemistry. Then, in chapter 15 the author discusses methodology of studying the ion exchange resins. In chapter 16 he describes a problem of physical and chemical stability of the ion exchangers; this information is useful when one wants to selected a particular resin for specific application.

Very useful, too, is the last, the 17-th, chapter in which the author presents principles of economical evaluation of ion exchange processes for particular application.

In this book Dr. KUNIN shares with readers a practical experience he has gained over a half century of his work on ion exchange.

Lucjan Pawłowski

TrAC — Trends in Analytical Chemistry, Reference Edition, volume 4, 1985, TrAC Compendium Series 4, Elsevier 1986, 280 pages, price: US $ 109.25, ISBN 0-444-42635-3.

Analytical chemistry plays a very important role in pollution control. However, the proper use of analytical methods in that area is not an easy task, since the systems to be analysed are very complex.

Therefore, it is so important to provide proper information on new, more efficient methods of chemical analysis for people working in the field of pollution control.

The book reviewed is a topical monthly digest of current developments of new ideas in the analytical sciences. It publishes broadly based, easy-to-read reviews, features and opinions by leading scientists.

A significant part of the book is devoted directly to specific issues of analysis, i.e.:

"Environmental analysis using gas chromatography–atomic absorption spectrometry",

"Ion chromatography in the analysis of natural waters",

"FORTH — a good programming environment for laboratory automation?, the use of chemometrics in apportionment of air pollution sources",

"Dissolved oxygen: the electroanalytical chemists dilemma",

"Chemical sensing in the environment",

"The challence to the analytical chemist, application of flow injection analysis to water pollution studies — etc".

Another topic widely discussed in the book is the application of microcomputers for interpretation of analytical data.

As a selection of papers written by different scientists the book is not uniform. However, it surely helps to discern what is going on in analytical chemistry and what is applicable for analysis of the environment.

Lucjan Pawłowski

Chemistry for Protection of the Environment, edited by L. PAWŁOWSKI, G. ALAERTS and W. J. LACY, Studies in Environmental Science 29, Elsevier Science Publishers, Amsterdam 1986, xii + 796 pages, price: US $ 180.0, ISBN 0-444-42715-5.

It is now widely recognized that the rapid growth of science, applied technology and industrial activities has brought tremendous benefits to human life. But on the other hand, it has led to our current confrontation with gross pollution and threats of irreversible environmental damage. Since the dangers of environmental degradation are now worldwide, joint effort at an international level and on an interdisciplinary scale will always be needed in order to come together and discuss common environmental problems. The Fifth International Conference *Chemistry for Protection of the Environment* was one of the many activities towards a better quality of life.

The meeting was organized by the Catholic University of Leuven (Belgium) from 9 to 13 September, 1985 and brought together nearly 200 scientists and engineers from 32 countries. Some of the papers read at the Conference have been selected for publication in the book under review.

It is worth noting that the Lublin Conference (Poland), held in 1976 (with Professor Pawłowski as the most active member of the Organizing Committee), was the first comprehensive effort in a series of similar meetings. The topics presented then, concentrated on the physical-chemical methods of water and wastewater treatment. Since 1981, selected papers have been published by Elsevier in the series *Studies in Environmental Science.*

The Fifth Conference *Chemistry for Protection of the Environment* covered the following major topics: environmental impact of toxic and hazardous substances, environmental implications of fossil fuel processing, advanced analytical procedures and current methods of water treatment. As usual, a number of papers and reports have been selected for publication to give a total of 14 chapters.

Chapter 1 comprises three plenary lectures devoted to the following problems: environmental nuisance of hazardous substances, advanced physicochemical and biochemical methods in water and wastewater management, as well as the removal of micropollutants by biological and physicochemical treatment methods.

Chapter 2 has been given the title *General problems.* The five contributions included there deal with such topics as environmental nuisance due to solid wastes, effects of industrial micropollutants upon human health, toxic effects of organic substances and methods of identifying them, etc.

Four experimental studies constitute the subject area of chapter 3. They concentrate on the processing of fossil fuels, on the treatment of the effluents from the manufacture of soap and detergents, as well as on the decontamination of soil and sludges.

Chapter 4 incorporates seven experimental contributions dealing with the environmental impact of chemical pollutants. These are predominantly heavy metals, their behaviour (migration in soil, airborne concentrations), methods of removal (from sewage sludges), and methods of determining limit (critical) concentrations (in vegetation and soil). One of these contributions not only gives an account of the programme and involvement of the European Community in water pollution control, but also presents a list of 129 compounds creating potential environmental hazards.

The title of chapter 5 reads: *Physico-chemical treatment: oxidation and disinfection.* The chapter consists of one paper only, which comprises a descriptive discussion of photomineralization and photodegradation of organic substances found in the aquatic environment and in the atmosphere.

Chapter 6 includes six experimental reports on flocculation, flotation and related problems. The subject may be divided as follows: effect of some parameters on the flocculation of kaolinite, coagulation of humic substances, actual model describing the precipitate flotation of heavy metals, effect of pH and magnesium on the removal of colour and turbidity, pilot plant designed for the treatment of industrial effluents (removal of asbestos fibres), and applications of active aluminium hydroxide for the removal of refractory substances from wastewater.

The subject of filtration has been incorporated in chapter 7. It consists of three experimental contributions which cover the following topics: physicochemical treatment (desulphurization) of the effluents from steel mills, removal of airborne SO_2 by non-woven strongly basic filtering materials, and decolorization of textile effluents by ultrafiltration.

Chapter 8 has been entitled *Physico-chemical treatment: adsorption* and contains four papers. Three of these are devoted to the adsorption of humic substances on activated carbon, to the selective separation of mercury by chemically modified biopolymers, and to the choice of granular activated carbon for the removal of micropollutants from aqueous solutions. The remaining paper deserves special attention as it gives a comprehensive account of the applications, economics, prospectives and models dealt with in the process of adsorption on activated carbon (with respect to water and wastewater treatment).

The three papers incorporated in chapter 9 are devoted to ion exchange and its application to the treatment of industrial effluents.

Chapter 10 comprises four contributions (predominantly of an experimental nature) to the problems of biological and chemical treatment. These are as follows: concentrations of amino acids after successive stages of water treatment, bioregeneration of activated carbon, methods of plankton growth control in water, and agricultural applications of industrial sludges.

One of the two papers included in chapter 11 (which is devoted to the environmental impact of fossil fuel processing) deserves particular consideration. This is an interesting account of the methods of evaluating the source of origin, as well as the nature and quantity of trace elements which are found in the effluent from the processing of high-sulphur coal. It also indicates the possibility of treating such wastes. The other paper belonging to this chapter is experimental in nature and deals with the identification of volatile organic constituents of wastewater from oil shale processing.

The environmental nuisance of organic pollutants is the subject of chapter 12, which comprises two reports. One of these pertains to the application of enzymes to removal of aromatic compounds from aqueous solutions, whereas the other one is devoted to the sorption of toxic organics in aquiferous layers.

Chapter 13 contains four papers which concentrate not only on the processing of fossil fuels and other organic chemicals, but also on the treatment of wastewater (or on the disposal of solid wastes) generated by these processes. One of the papers belonging to chapter 13 presents the programmes and concepts developed by the U.S. Energy Department in the field of processing, recorvery and utilization of fossil fuels to make them acceptable to the environment. The experimental reports included there discuss such problems as elimination of crude oil leakage, potential utilization of solid wastes produced by power industries, and ozonation as a process applied to the treatment and recirculation of textile effluents.

Chapter 14 includes six contributions and describes the advanced techniques made use of in analytical chemistry, which may be of equal utility in environmental pollution control. The methods of interest enable identification and determination of toxic substances, heavy metals or organic pllutants (which are often found in trace amounts), and chlorine in the atmosphere, as well as in the aquatic environment.

The book contains an author index and a subject index which are of great value to the users.

It is a peculiarly happy circumstance that the publisher has presented a valuable collection of theoretical and experimental papers prepared by scientists and engineers in different fields and specializations. In this way we become aware of the latest achievements and trends in the environmental applications of chemical processes throughout the world. In general, it is obvious that the efforts on the part of the United States concentrate on abating the nuisance of fossil fuel processing (this holds particularly for new energy sources as oil shales, tar sands, etc.). The interest of Canadian and European scientists is focused on the environmental aspects of bituminous coal and lignite processing, as well as on adequate technologies for desulphurization of gases.

The book provides a comprehensive (796 pages) background — both on the theoretical and experimental bases — to the wide spectrum of interactions between man and his environment, and should therefore be of particular value to all environmental scientists and engineers. We must keep in mind that we are now beginning to live in an epoch of indignation about the ever increasing pollution and the irreversible environmental damage.

The book should also be made available to the readers through scientific libraries as quickly as possible.

In the U.S.A. and Canada the book is available from Elsevier Science Publishing Co. Inc., P.O. Box 1663, Grand Central Station, New York, NY 10163.

Katarzyna Majewska–Nowak