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Book review

ATMOSPHERIC DEGRADATION OF ORGANIC SUBSTANCES
Data for persistence and Long-range Transport Potential

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WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany
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The book *Atmospheric Degradation of Organic Substances* contains a concise and understandable scientific presentation of the various mechanisms that contribute to the photochemical degradation of organic molecules in the troposphere, their kinetics and the variables that influence the efficacy of the degradation processes. Photo degradability is treated as one of the most important intrinsic properties that have an effect on the atmospheric fate of chemicals, contributing to persistence and Long Range Transport potential, in relation with multimedia environmental fate models.

The book is structured on 3 chapters, References, Appendix and a Subject Index.

The first chapter *Significance of Photo-degradation in Environmental Risk Assessment*, begins with a short introduction about photo-degradation, persistence and potential for long- range transport of the chemicals, about regulators and environmental policy. In the last ten years, the discussions concerning chemicals were focused to an important property of the chemicals, as persistence. Persistence is the property of an organic substance that resists to degradation by chemical, photochemical and biochemical reactions in water solutions, air or soil, ensures their long term existence and stability during transport over long distances. In this chapter, the authors quoted many opinions regarding environmental persistence of organic substances covering representative reference materials. It is underlined that the multimedia approach causes a change in paradigm from effects to exposure based environmental risk assessment.

Besides, the development leading to a renewed interest in abiotic degradation in recent years arises from the political and regulatory development on POPs described in this chapter.

Chapter 2, *Abiotic Degradation in the Atmosphere,* focuses on the fate of organic molecules including semivolatile organic compounds. The science behind the photochemical degradation in the atmosphere is described. The abiotic degradation processes are distributed into indirect photochemical processes, direct photochemical transformations, degradation in the adsorbed state (semivolatile organic compounds), and degradation in the droplet phase. The abiotic degradation processes are considered as divided into: indirect photochemical processes, including dark reactions by reactive species formed in photochemical reaction cycles; direct photochemical transformation; degradation in the adsorbed state; degradation in the droplet phase. In the chapter content, some of these processes are approached, such as:

- photo-degradation in the homogeneous gas phase of the trophosphere, referring to indirect photochemical reactions (the reaction with OH-radicals, NO_3-radicals, ozone), direct photochemical reactions (with examples of photochemical reactions in the gas phase),
- heterogeneous degradation, which include degradation on solid surfaces, degradation in droplets

All these processes are described in great details, including experiments and examples series. Also, some experimental methods used for measuring k_{OH} (rate constant for the reaction with hydroxyl radical), $k_{Nitrate}$ (rate constant for the reaction with the nitrate radical), k_{O3} (rate constant for the reaction with ozone) are presented. The reaction rate constants can be used to calculate the lifetime of a substance introduced into environment, which represents a key-element in quantification of persistence. The elaboration of lifetime restricted to the troposphere can be considered a contribution to a solution of the persistence problem, but only partial, because entire process is more complex.

The final chapter of this book, *Table of Reaction Rate Constants of Photo-Degradation Processes,* contains a list of 1100 volatile, semi-volatile organic and some inorganic substances, arranged by CAS number and compound name, including k_{OH}, k_{Ozone}, $k_{Nitrate}$, k_{Photo} (rate constant for direct photolysis), with extensive literature listing. Additional information about these compounds is contained in the footnotes to the table. Not all substances listed in the table are produced by the chemical industry, some substances are research products.

Each chapter includes an extensive list of references.

The Appendix presents CAS Register with CAS Number and Chemical Name for a comprehensive list of organic substances.

The work explains in detail the methods, including computational ones, for the environmental assessment of volatile and semi-volatile substances, and is rounded off with data tables of degradation rates as a key resource for manufacturers and regulators of such substances.

This book represents an important information source and is addressed to the environmental experts, researchers, risk assessors in administration and industry and also, to other interested people who want to know more about the fate of organic compound into environment, especially in the atmosphere.

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