Series Preface

With remarkable vision, Prof. Otto Hutzinger initiated *The Handbook of Environmental Chemistry* in 1980 and became the founding Editor-in-Chief. At that time, environmental chemistry was an emerging field, aiming at a complete description of the Earth's environment, encompassing the physical, chemical, biological, and geological transformations of chemical substances occurring on a local as well as a global scale. Environmental chemistry was intended to provide an account of the impact of man's activities on the natural environment by describing observed changes.

While a considerable amount of knowledge has been accumulated over the last three decades, as reflected in the more than 70 volumes of *The Handbook of Environmental Chemistry*, there are still many scientific and policy challenges ahead due to the complexity and interdisciplinary nature of the field. The series will therefore continue to provide compilations of current knowledge. Contributions are written by leading experts with practical experience in their fields. *The Handbook of Environmental Chemistry* grows with the increases in our scientific understanding, and provides a valuable source not only for scientists but also for environmental managers and decision-makers. Today, the series covers a broad range of environmental topics from a chemical perspective, including methodological advances in environmental analytical chemistry.

In recent years, there has been a growing tendency to include subject matter of societal relevance in the broad view of environmental chemistry. Topics include life cycle analysis, environmental management, sustainable development, and socio-economic, legal and even political problems, among others. While these topics are of great importance for the development and acceptance of *The Handbook of Environmental Chemistry*, the publisher and Editors-in-Chief have decided to keep the handbook essentially a source of information on "hard sciences" with a particular emphasis on chemistry, but also covering biology, geology, hydrology and engineering as applied to environmental sciences.

The volumes of the series are written at an advanced level, addressing the needs of both researchers and graduate students, as well as of people outside the field of

"pure" chemistry, including those in industry, business, government, research establishments, and public interest groups. It would be very satisfying to see these volumes used as a basis for graduate courses in environmental chemistry. With its high standards of scientific quality and clarity, *The Handbook of Environmental Chemistry* provides a solid basis from which scientists can share their knowledge on the different aspects of environmental problems, presenting a wide spectrum of viewpoints and approaches.

The Handbook of Environmental Chemistry is available both in print and online via www.springerlink.com/content/110354/. Articles are published online as soon as they have been approved for publication. Authors, Volume Editors and Editors-in-Chief are rewarded by the broad acceptance of *The Handbook of Environmental Chemistry* by the scientific community, from whom suggestions for new topics to the Editors-in-Chief are always very welcome.

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Preface

When studying the environment and the impact of human activities on it, we soon realise that we are dealing with a unique system, where the different compartments are strictly interconnected. On the one hand, we are to make simplifications and to fragment reality; on the other one, we see that the environment is a continuum. Exposure assessment of chemicals, as the majority of the branches of applied sciences, draws together several different disciplines. A number of works describe exposure assessment and chemical fate modelling, either in the environment or in the human body. Nevertheless, in our opinion, there is a lack of tools and information enabling investigators to understand and model the complexity of reality and therefore to obtain solutions to practical problems. The fate of chemicals in both the environment and in the human body is a very complex matter, but despite this, models have to be coupled, if we want to assess the behaviour over the whole chain and to hypothesise the possible impacts not only on the environment but also on human health. Only in this way, modelling the fate of chemicals becomes an actual and useful tool to manage the problems connected to the use of chemicals and to take actions to solve or at least to limit them. We strongly believe that the future will necessarily guide policy makers, researchers and all stakeholders to the full integration of exposure assessment.

It is with this challenge in mind that we decided to write a book about modelling the fate of chemicals in the environment *and* the human body. This work is the outcome of many years of experience and of different research activities that have led to the development of MERLIN-Expo, a software for simulating the fate of chemicals in the main environmental systems and in the human body in an integrated way (http://merlin-expo.eu/).

The book is composed of ten chapters. The first chapter considers the challenges of exposure assessment for the future and the evolution of human health and environmental risk assessment. The second chapter is concerned with the SWOT analysis performed to evaluate the potential of MERLIN-Expo and its relevance in legislative frameworks. In the third chapter, the standard documentation of exposure models that was developed in collaboration with CEN (European Committee

for Standardization) is described. Fourth to ninth chapters describe the modelling of different environmental compartments (i.e. surface waters, atmosphere, soil, groundwater, plants, aquatic organisms and mammals). The tenth chapter focuses on the fate of contaminants in humans using a lifetime physiologically based pharmacokinetic model.

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http://www.springer.com/978-3-319-59500-9

Modelling the Fate of Chemicals in the Environment and the Human Body

Ciffroy, P.; Tediosi, A.; Capri, E. (Eds.)

2018, XX, 262 p. 30 illus., 19 illus. in color., Hardcover
ISBN: 978-3-319-59500-9