

# **The Handbook of Environmental Chemistry**

**Founded by Otto Hutzinger**

**Editors-in-Chief: Damià Barceló • Andrey G. Kostianoy**

**Volume 18**

## **Advisory Board:**

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# The Handbook of Environmental Chemistry

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Volume Editors: B. Bilitewski, R.M. Darbra, and D. Barceló  
Vol. 18, 2012

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Vol. 3/U, 2009

### **The Black Sea Environment**

Volume Editors: A. Kostianoy and A. Kosarev  
Vol. 5/Q, 2008

# Global Risk-Based Management of Chemical Additives I

Production, Usage and Environmental  
Occurrence

Volume Editors: Bernd Bilitewski · Rosa Mari Darbra ·  
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With contributions by

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# **The Handbook of Environmental Chemistry**

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## **Aims and Scope**

Since 1980, *The Handbook of Environmental Chemistry* has provided sound and solid knowledge about environmental topics from a chemical perspective. Presenting a wide spectrum of viewpoints and approaches, the series now covers topics such as local and global changes of natural environment and climate; anthropogenic impact on the environment; water, air and soil pollution; remediation and waste characterization; environmental contaminants; biogeochemistry; geoecology; chemical reactions and processes; chemical and biological transformations as well as physical transport of chemicals in the environment; or environmental modeling. A particular focus of the series lies on methodological advances in environmental analytical chemistry.





## 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/](http://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.

Damià Barceló  
Andrey G. Kostianoy  
Editors-in-Chief

# Volume Preface

This first volume of the RISKCYCLE book analyzes the chemical additives used in the production of important industrial sectors. Additives are substances that are used to improve the characteristics of the final product.

In the first part, a review of the additives used in the sectors of textiles, electronics, lubricants, plastics, paper and leather is carried out with an emphasis on the function of each compound inside the product. For example, flame retardants reduce the potential ignition of the products; others are water repellent or biocides. These additives due to their chemical structure may have a potential impact on the environment or human health when released from the product.

The potential effects of the mainly used additives are presented in this volume in detail together with data on the world production and trade of these compounds. The aim of the RISKCYCLE project is to assess the risk of chemical additives at global scale, and it is therefore essential to know more about the world distribution of these compounds and their potential impact.

In the second part, a detailed perspective of the chemicals used in the aforementioned sectors in different countries is presented in case studies. One very interesting case concerning the recycling of paper in Vietnam is thoroughly analyzed. The emissions of additives from plastics in Sweden give a new insight on the subject, and the recycling of electronic waste in Brazil is also a case to highlight. These different case studies show the magnitude of the trade of these chemicals all over the world and their potential impact on human health and the environment if they are not correctly treated.

We hope that this book is of interest for the scientific community and will help to increase knowledge and awareness on issues raised by the different chemical additives used in major industrial sectors.

Finally, we would like to thank all the authors who have contributed to this book, for their effort in gathering the information and elaborating the different chapters.

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