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ENVIRONMENTAL TOXICITY TESTING

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The book *Environmental Toxicity Testing* is an important tool for anyone interesting in studying and understanding the environment. In order to ensure environmental protection it is necessary to know and comprehend the relations between different media as well as the interactions and the effects of some of the compounds discharged in these media and the ecosystems. More and more studies are starting to address the impact of pure chemicals on different levels of environmental organization. The toxic compounds can be found in soil, air and water, disturbing the natural cycles and influencing both the biotic and the abiotic factors of the ecosystems.

The first chapter of the book (*Historical perspective and overview*, author Jim Wharfe) is an overview on man's evolution and his interaction with the environment, beginning with the first human populations and ending with the human society of the 21st century, when the dependence of man on chemicals is obvious and it's an important part of the industrial development. This chapter also includes an overview on the most important events in the history of chemical usage, the importance of ecotoxicity testing in the decision-making process, global legislation concerning chemicals and a few “ideas” about how future should look like.

The second chapter (*Effective monitoring of the environment for toxicity*, authors Ian Johnson, Paul Whitehouse and Mark Crane) aims to synthesize the importance of ecotoxicological testing and the necessity of an effective monitoring program. In order to develop a monitoring program, it is necessary to determine the type of response of living organisms to different types of toxic chemicals and, also, to select those types of responses that are quantifiable. The authors of the chapter presented the most important stages in designing a monitoring program, taking into account the importance of ensuring the reliability of the test data.

The third chapter (*The nature and chemistry of toxicants*, author Ulf Lidman) is very important for anyone who tries to understand the relations and the impacts of chemicals on the environment. Because man depends on so many types and classes of chemicals, it is very important to know the way in which the chemicals interact with the environment. This chapter presents the most important classes of chemicals with high impacts on the environment, as follows: metals, halogenated hydrocarbons, polycyclic aromatic hydrocarbons, medical and veterinary drugs.

Due to increased ecological and toxicological problems originating from the release of toxic contaminants in the environment, it has become obvious that methods of evaluating the toxicity of these chemicals are needed. Because a living organism does not respond to a single pollutant and, usually, the final response is the result of a cumulative effect, it is very important to possess methods that could differentiate the types of responses.

Chapter four (*Frameworks for the application of toxicity data*, authors Maria Consuelo Diaz-Baez and Bernard J. Dutka) presents different ways of interpreting the toxicological data using mathematical relations in order to quantify the impact of the toxic compounds on the environment. Also, an attempt is made to describe some applications of toxicological data, their analysis and the manner of integration in ecological risk assessment.

One of the most valuable resources of mankind is water. But, similar to all other resources, water's quality is depreciating. In order to maintain the same quality of life and even to improve it, it is important to have access to clean sources of water. Like all other ecosystems, the aquatic ecosystems are exposed to pollution, maybe more than soil or air ecosystems. Because the aquatic ecosystems are in continuous changing due to migrations of organisms, changes in water and sediment compositions, it is difficult to assess the water quality. Chapter five (*The aquatic environment*, author William L. Goodfellow Jr.) describes some methods used in evaluating the toxicity of the aquatic medium, both in aquatic phase and in sediments. A very important aspect of water pollution is the bioavailability of contaminants in water and sediments. Bioavailability is controlled and influenced by several factors. These factors are also discussed in chapter five along with methods of estimating the bioavailability.

Chapter 6 (*Biological methods for assessing potentially contaminated soils*, authors David J. Spurgeon, Claus Svedensen and Peter K. Hankard) presents the biological standardized procedures, academically established methods, emerging techniques used for assessing potentially contaminated soils. It stresses that a biological approach offers a number of advantages over the chemical approach. In order to choose the right biological method, it is important to know the available methods. In this chapter are included several types of tests, worldwide used, to assess the effects of contaminants on the biological status of soil ecosystems, these tests measure parameters ranging from ecosystem functions to molecular genetic response. The testing methods are classified in standardized procedure and academically established methods. The chapter also includes new techniques that have the potential to be used as assessment methods in the future.

Chapter seven (*Review of biomarkers and new techniques for in situ aquatic studies with bivalves*, authors Francois Gagne and Christian Blaise) offers some considerations to the effects of pollutants on the reproductive status of biomarkers and on other new techniques used for *in situ* aquatic studies.

Beside key definitions for biomarkers, this chapter discusses for types of biomarkers: biomarkers of exposure, biomarkers of early biological effects and defense, biomarkers of damage and biomarkers of reproduction. Each type of biomarkers is presented separately and, at the end of the 7th chapter it is presented a method that can be used to interpret the information obtained with biomarkers.

The most complex approach in ecotoxicology is the genetic effect of chemical compounds. Chapter eight (*Environmental monitoring for genotoxic compounds*, authors Johan Bierkens, Ethel Brits and Luc Verschaeve) presents types of genotoxic effects – like gene mutations, chromosome mutations and genome mutations – methods of testing the genotoxicity of different compounds and of assessing the exposure to genotoxic compounds. Because of the importance of this effect, the 8th chapter highlights the ecological implications of genotoxic effects.

In order to ensure that all the environmental issues discussed before are treated with the needed seriousness, it is important to have a large view over the legislation. Chapter nine (*Approach to legislation in a global context*, author Jim Wharfe) offers an approach to the legislation regarding chemical compounds, on a global scale. This chapter is divided in four parts, each part presenting a legislation overview for a different country: Part A – the UK perspective; Part B – the Netherlands perspective; part C – the German perspective and Part D – the USA perspective. This chapter highlights that the environmental strategies adopted in each country are very much influenced by the country's historical and cultural heritage.

The second to last chapter of the book (*Case study: Whole-effluent assessment using a combined biodegradation and toxicity approach*, authors Graham F. Whale and Nigel S. Battersby) is a case study that shows how, using a combined biodegradation and toxicity approach, the toxicity of three complex effluents has been assess. All three effluents are petrochemical effluents. The chapter presents the methodology used for the combined biodegradation and toxicity assessment and discusses how the data are collected and interpreted.

The final chapter of the book (*Potential future developments in ecotoxicology*, authors Wim de Coen, Geert Huyskens, Roel Smolders, Freedy Dardenne, Johan Robbens, Marleen Maras and Ronny Blust) is an insight into the future of ecotoxicology and environmental pollution assessment, using quantitative and qualitative data. Of major importance is the development of new methods capable of assessing toxicity and genotoxicity for a larger range of compounds and mixtures, this being one of the research topics in the future.

The authors discuss about the future research needs in ecotoxicology and the challenge to optimize the knowledge related to the increased volume of toxicological data, in the framework of the expectation that ecotoxicology will mature into a complementary tool to unravel the emerging environmental toxicological problems.

This book offers groundwork on different aspects regarding environmental toxicity, in the conditions when important improvements are needed to enhance the understanding of the chemical interactions between biota and environment. Also, it can solve some of the problems arising from the invariable complexity of environmental exposure where a multitude of physicochemical factors act together as a complex mixture.

Easy to use and consult, the book is an important assess for teachers, students and employees that are involved in environmental practices.

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