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# Solid Waste Management and Treatment

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# FOREWORD

The world of waste—complex and often little known—has become a rapidly expanding field in recent years. Waste treatment, like the regulations that govern it, will continue to evolve as knowledge advances.

Education in the field of solid waste is a recent development, reflecting the consequences of our way of life.

This educational and didactic book on solid waste treatment is intended for students in process engineering, environmental engineering, environmental chemistry, and other environment-related disciplines. It draws on several years of experience teaching the “Solid Waste” course within the new LMD system (Master 2 and Licence 3).

In this text, the subject of waste is approached in a simple and comprehensive way, from its generation to its treatment through appropriate channels, including collection and the various facilities associated with it. Technical in scope and extensively illustrated, this book provides students with the scientific and technical information they need to understand and develop different methods of solid waste treatment.

Through a logical progression, the reader is led to a better understanding of what waste is, its life cycle, its sources of generation, its environment, its classification, its properties, the treatment and transformation processes involved, as well as its impact on human health and the environment.

Henceforth, waste in all its forms and from all sources—obsolete objects, sludge residues, or minute pollutants, whether urban, industrial, agricultural, or mining—will no longer remain hidden, taboo, or marginalized, but will be reintegrated into the modern industrial ecosystem.

# GENERAL INTRODUCTION

For a long time, nature itself was entrusted with the task of degrading waste. Materials that could not be fed to animals were buried, burned, or used as fertilizer.

However, economic and social progress, together with the explosive growth of the world's population and its needs, has created major challenges, including the increasing quantity of domestic and industrial waste.

This price paid for improving our living conditions is accompanied by serious threats to health, ecosystems, living environments, and the economy. Consequently, a major objective of industrial activity is now to control environmental impacts. This has led many institutions to equip themselves with specialists capable of defining and steering environmental management strategies and actions in compliance with extensive national and international regulations. Protecting human health, ensuring plant safety, and preserving the environment have thus become both performance standards and factors of business competitiveness.

Waste includes various chemical, mineral, and organic substances, whether natural or synthetic, occurring alone or in combination. Each household, and indeed each stream of household waste, can be regarded as a specific entity. This peculiarity partly explains why a systematic approach to waste management is so complex. The task is further complicated by the fact that waste is essentially a solid domain, marked by pronounced heterogeneity. Studies carried out in recent decades have nevertheless made it possible to manage solid waste more effectively.

To this end, new rules and laws have been introduced, leading to the wider adoption of new treatment methods: raw material recovery, combustion for energy recovery, storage, and others.