
ASSESSMENT OF BIODEGRADABLE PLASTIC FATE IN THE ENVIRONMENT

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Abstract

Biodegradable plastics (BPs) have lately received attention as possible solutions to the problem of plastic pollution. Plastics have brought numerous benefits to human society, but their misuse and mismanagement have also brought environmental issues. For this reason, BPs have been proposed as alternative materials in specific applications (e.g. mulch films, fishing gears, packaging, disposable bags). In 2021, the global production capacity for BPs was 1.55 million tonnes and is foreseen to almost reach 5.29 million tonnes in 2026. However, the kinetics of degradation and potential environmental effects of BPs are still poorly understood. Biodegradation is a system property, meaning that biodegradation depends on both the specific material properties and the conditions of the environment receiving it. Hence the same material can biodegrade differently in different types of environments. In this work, we studied biodegradation of commercially available products made of biodegradable polymers (i.e. PLA, PBAT, starch blends) in three different environments (i.e. air, soil, seawater) for up to 1 year of exposure. To describe biodegradation rate and the physical-chemical mechanisms involved, several characterization techniques were applied, including Pyr-GC/MS, GPC, FTIR and SEM.

Keywords: biodegradable polymers, Py, GC/MS, degradation

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