

Biodegradability of biobased polymeric materials in natural environments: Structures and Chemistry

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ABSTRACT:

The development of biobased polymer materials from renewable resources meets the concept of sustainability, offering the potential of renewability, biodegradation, and a path away from the problems associated with plastic derived from nonrenewable sources. As the biomaterials interest grows, the ecological impact of these postconsumer polymer products, when they enter into waste streams (landfill, compost, marine water, and sewage), does not contribute negatively toward the environment. The ultimate fate of biodegradable polymeric materials is focused on their conversion by microorganisms into final elemental products such as carbon dioxide, water, and new microbial biomass (i.e., mineralization). In this chapter, the necessary conditions for biodegradability of polymers, as well as the involved physical, chemical, and biological mechanisms, are reviewed. Various analytical techniques and standard test methods for evaluating the potential biodegradability and its toxicity level of polymeric materials in different environments are discussed in accordance with international standards and regulations