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Biodegradable Polymers

PEP Report 115E

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Abstract

Biodegradable polymers are typically designed to degrade to carbon dioxide (CO_2) and water through the action of living organisms in industrial composting facilities. Global consumption of biodegradable polymers has risen sharply in the past few years, driven by regulations that aim to reduce plastic waste and by the increased public awareness of environmental issues regarding plastic waste. Demand is expected to increase from nearly 854,000 metric tons in 2020 to 3 million metric tons in 2025. Major biodegradable polymers include starch compounds, making up 62% of biodegradable polymers, and polylactic acid (PLA) and PLA compounds accounting for up to 33% of the demand. The remaining biodegradable polymers include polybutylene adipate terephthalate (PBAT), polybutylene succinate (PBS), and polyhydroxyalkanoate (PHA).

Eliminating single-use plastics (SUPs) has been identified as a priority for reducing environmental pollution by plastics. In mainland China, new regulations banning nondegradable plastic bags and SUP utensils, including nondegradable plastic straws, began to be implemented on 1 January 2021 in phases. By 2022, nondegradable plastics bags and SUP utensils will be banned in shopping malls, supermarkets, and food takeout services in most other cities and towns in mainland China. By 2025, the ban will be extended nationwide to cover plastic postal and courier packaging bags. These new regulations have spurred many new projects for biodegradable polymers in mainland China. Several high-capacity biodegradable projects have been announced. These include Kanghui Dalian New Materials' (a subsidiary of Hengli Petrochemical) 450,000 metric tons PBS project and Inner Mongolia Junzheng Energy & Chemical Group's 1 million metric tons per year (MMt/y) PBAT/PBS/PBT/PTMEG project. PBAT capacity in mainland China was about 304,000 metric tons in 2020, but may skyrocket in a few years and reach 2.5 million metric tons (based on a recent *China Chemical Reporter* article).

This report presents an update on the commercial status, new developments, and trends in biodegradable polymers and will provide process economics for three biodegradable polymers: PBAT, starch-based polymer, and polybutylene succinate adipate (PBSA).

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