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Chemical Recycling of PET

PEP Report 199D

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Abstract

Globally, approximately 21.6 million metric tons of bottle-grade polyethylene terephthalate (PET) was consumed in 2017. The PET bottle market has been growing globally, which naturally has led to a growing used PET bottle waste stream worldwide. To prevent mountains of PET bottles in landfills, recycling of used PET is desirable. A portion of the post-consumer PET waste is mechanically recycled. Some of the collected post-consumer PET have also been exported to China. However, with China's recent crackdown on imports of postconsumer plastics, there has been an urgent drive for innovation in plastic recycling. Chemical recycling (also referred to as feedstock recycling) of PET can be used to recover PET raw materials or produce new raw materials.

In this report, the industrial status of PET recycling will be presented. Various options for PET recycling will be discussed in the technology review with particular emphasis on chemical recycling of PET. New processes for chemical recycling of PET including Carbios (a fermentation process), Gr3n (microwave depolymerization), Garbo (glycolysis to bis(2-hydroxyethyl) terephthalate), Loop Industries (ambient condition depolymerization), and Ioniqa Technologies (glycolysis with an ionic liquid catalyst complex to bis(2-hydroxyethyl) terephthalate) will be examined. Existing commercial processes for chemical recycling of PET will also be reviewed. The process economics for chemical recycling of PET by 1. A glycolysis process using an ionic liquid catalyst complex, 2. Uhde Inventa-Fischer Flake to Resin (FTR®) partial glycolysis process and 3. Eastman methanolysis process are presented. This report will be of value to those companies engage in plastics production, particularly PET production, and major brand owners that utilize these plastic products.

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