

Optimization and Comparative Study of Various Strategies in the Chemical Recycling of Polyethylene Terephthalate (PET) via Depolymerization

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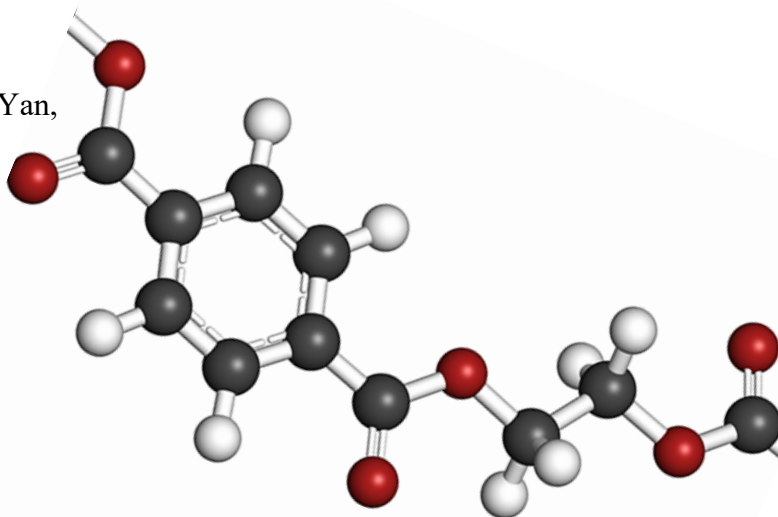
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Abstract



Polyethylene terephthalate (PET) is a non-biodegradable plastic (polymer) commonly used in packaging (e.g. plastic water bottles). Unique properties of PET such as shatter resistance, great tensile strength, excellent chemical resistance, lightweight, elasticity, and stability over a wide range of temperatures are why PET is still used to this day.

Recycling PET is usually done by mechanical recycling. However, mechanical recycling is limited by eventual material downcycling, necessitating product repurposing to lower-value applications. Conversely, chemical recycling enables product quality to be preserved by breaking PET down into monomers, then reacting the monomers with each other to produce the exact same product.

Consequently, we are attempting to compare various strategies of depolymerization of PET and to investigate the most effective method as well as the advantages and disadvantages regarding various aspects (e.g. economical, environmental) of the methods. In addition, through a number of experiments, an optimized strategy for the chemical recycling of PET has been discovered which is also presented in this article.