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Preparation of bis(2-hydroxyethyl)terephthalate from waste polyethylene terephthalate

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Abstract

The process of depolymerization of waste polyethylene terephthalate (PET) bottles by glycolysis in the presence of a catalyst – zinc acetate was investigated. Degradation of PET was performed in two ways: 1) using conventional heating to 140-180 °C; 2) using microwaves (MW). The process led to a homogeneous mass. The conditions for selection of the desired product – bis(2-hydroxyethyl)terephthalate (BHET) were found. It was studied that the use of MW substantially increases the yield and significantly reducing the time of depolymerization. The concentration of the catalyst (from 0.125 to 1.0 % wt.) has no significant effect on the yield of bis(2-hydroxyethyl)terephthalate when using MW unlike with conventional heating. The resulting product is a white crystalline powder with a melting point 108 °C with hydroxyl number = 436 mg KOH/g, which substantially corresponds to the literature data.