

Conversion of Waste PET into Important Chemicals Using Amines

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Poly(ethylene terephthalate) (PET) is one of the versatile engineering plastics showing excellent thermal and mechanical properties. PET recycling represents one of the most successful and widespread examples of polymer recycling. In this study, aminolytic depolymerization of poly(ethylene terephthalate) (PET) taken from waste soft-drink bottles, under microwave irradiation, is proposed as a recycling method with substantial energy saving. The reaction was carried out with amines with and without the use of zinc acetate as catalyst in a sealed microwave reactor in which the pressure and temperature were controlled and recorded. Experiments under constant temperature or microwave power were carried out at several time intervals. The main products were pure bis(2-hydroxyethyl) terephthalamide (BHETA) and ethylene glycol which were analyzed and identified by FTIR and DSC measurements. It was found that PET depolymerization, is favoured by increasing temperature, time and microwave power. It was observed that at the lower power used (i.e. 50 W) even after 20 min of irradiation the PET degradation was only 10%, while when 100 W was invoked almost complete depolymerization occurred in only 5 min. Compared to conventional heating use of microwave irradiation during aminolysis of PET, certainly results in shorter reaction times supporting thus the conclusion that this method is a very beneficial one for the recycling of PET wastes.

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