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Preparation of Rigid Polyurethane Foam from Recycling of PET Waste

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Abstract

With increasing Poly (ethylene terephthalate) (PET) consumption as packaging material, the effective utilization of PET waste has received broad attention for the preservation of resources and protection of the environment. Since PET waste does not create hazards to the environment, its volume and cost of landfilling are very high. Various methods have been proposed for recycling waste PET. We report here a straightforward, practical, and novel preparation method for the recycling of PET waste bottles to prepare RPUFs (rigid polyurethane foams) by using propylene glycol (PG) in different glycol/polymer molar ratios. The effects of the different molar ratios of glycol/PET on glycolyzed products have been investigated. GPC results show that a high portion of oligomers are monomer, dimmer and trimmer, and a lower portion of oligomers had a higher molecular weight. The viscosity of glycolyzed products decreases with an increase in the ratio of glycol/PET in glycolysis processes. Moreover, the PET glycolysis reaction in a sealed reactor led to a reduction of PET flakes dissolution time and increase in the degree of PET depolymerization.

The results show density, compressive strength, modulus, thermal stability and the thermal conductivity coefficient of foams are affected by the molar ratio of glycol/PET and blowing agent. As a consequence, it is possible to produce rigid polyurethane foams by using glycolysis products of waste PET with properties similar to that produced by the foams with originalpolyol

Biography:

Dr. Abolfazl Ghaderian has completed his PhD with honor from Institute of Chemical Research of Catalonia in Spain. He has decided to pay off his debt to mother earth and try to manage PET waste bottles by converting to useful material. Moreover, the replacement of fossil fuels with a sustainable energy sources such as water and sun is his second goal. Hence, he has started two enviromental chemistry projects, one in PET recycling and another on polymers for fuel cell application. The results of his scientific works have published in high impact journals.

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