

ABSTRACT

This thesis deals with a new low-energy method of chemical recycling of poly(ethylene terephthalate) (PET) using natural oils as reagents and microwave irradiation to accelerate depolymerization.

The results of experiments with PET waste and castor oil, when the reaction mixture was heated in microwave reactor, showed that a complete depolymerization of PET chain has occurred. Optimal conditions for the depolymerization PET were established: wt. ratio of PET / castor oil = 1 / 9.7, when the molar ratio of ester bonds of PET / hydroxyl groups of castor oil = 1 / 2.7, catalyst : zinc acetate at wt 1% from the PET mass, reaction temperature ranging from 235 to 245°C and the reaction time 60 min.

Decomposition experiments also showed, that microwave irradiation accelerated decomposition of PET. Depolymerization reaction in MW reactor was complete at 6x shorter reaction time than the decomposition in the classically heated reactor.

The results of analysis showed that the resulting product, the recyclate, was composed of unreacted castor oil and polyol products, that contained partially or fully esterified structural unit of PET, which were ended by ester-linked units of castor oil.