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Cristina Aguirre et al., Int J Waste Resour 2016, 6:3(Suppl)
http://dx.doi.org/10.4172/2252-5211.C1.003

2nd World Congress and Expo on

Recycling

July 25-27, 2016 Berlin, Germany

Study of the mechanical behavior of synthesized elastomers from depolymerization of polyurethane foams wastes

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Polyurethane foams wastes (WFP) are usually destined to landfills without any recovery. In order to contribute to dispose of new alternatives, a experimental design 3x2 was proposed to study the mechanical behavior of synthesized elastomers which were obtained from depolymerization of WFP. Depolymerization reaction of foams was carried out with sodium hydroxide as catalyzer. The decomposing agent used was castor oil (CO) in mass ratio of 3:1 with respect to WFP. The decomposition product (DP) was characterized by viscosity analysis according to ASTM D2196 and hydroxyl groups analysis by FTIR according to ASTM E168 was carried out. Synthesis of the polyurethane elastomer was performed from DP, which was subjected to a reaction synthesis with diphenylmethane-4, 4'- diisocyanate (MDI) and subsequent curing process in a heated mold at 90^{0}C under pressure of 2500 psi. Finally, it was possible to determine the influence of reactants ratio (MDI to DP, in mass ratio of 1:2,2; 1:2,7 and 1:3,2) and curing time (15 and 50 min) in terms of fracture strength of the obtained elastomer, in accordance with ASTM standard D412-15^a. The decomposition product had a viscosity of 26000 cPs and the hydroxyl groups (OH) were observed by FTIR in a wavelength of 3380.17 cm-1. The OH plotted band had a peak area of 46 A cm-1, which corresponds to the presence of a polyol. The measured mechanical properties were found to be strongly influenced by the mass ratio of MDI to DP. The relation which allowed the major tensile strength (13.4 MPa) on elastomer of polyurethane was 1:2.2 along with a curing time of 15 min.

Biography

Cristina Aguirre has completed her pre-grades studies in Chemistry Engineering from National Polytechnic School. Currently, she is working as an Assistant Professor at the Department Nuclear Science of National Polytechnic School.

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