

Thermal, Mechanical and Rheological Properties of homo HDPE synthesized at Different Polymerization Conditions

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Polymerizations of linear high density polyethylene (HDPE) were carried out in a 300 ml semi-batch autoclave reactor equipped with a mass flowmeter and a temperature control unit. The polymerization was performed with a continuous ethylene flow to meet the desired ethylene pressure. Different combinations of polymerization conditions were used. Two levels of temperatures (60°C and 80°C); three levels of pressures (1, 3 and 6 atm) and two levels of polymerization times (0.5; 1 hr) were used. The synthesized polymers were characterized by GPC-IR for molecular weight and molecular weight distribution. Thermal properties of all linear HDPE were measured in TA Q1000 DSC for crystallinity, melting and crystallization peak temperatures. Mechanical properties such as tensile modulus, tensile strength and strain at break were measured using Instron testing machine. Rheological properties were measured in ARES rheometer. Thermal, mechanical and rheological properties of the different HDPE resins were correlated to their polymerization conditions. Results were analyzed to assess the impact of the different polymerization conditions on the thermal, mechanical and rheological properties of HDPE. Acknowledgement: This research is supported by KACST under project # AT-26-67. KFUPM is also acknowledged for supporting this research.