Polypropylene heterophasic copolymer grafting Itaconic Acid: Molecular structure analysis through fractionation techniques.

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Heterophasic polypropylene copolymers are products formed by crystalline matrix of polypropylene and ethylene-propylene rubber phase, were typically, a crystalline matrix either isotatic polypropylene or random ethylene-propylene, are synthesized in first step (first reactor) and subsequently, a rubber phase composed by ethylene-propylene rubber copolymer (EPR) in this second step (second reactor).[1,2] These polymers were functionalized in the melt (extrusion) at 180ºC with itaconic acid (AIt) using 2,5-Dimethyl-2,5-di(tert-butylperoxy)hexane as radical initiator. FTIR was used to confirm the existence of grafting and quantification of monomers.[3,4]

In this study two copolymers were grafted with itaconic acid. The goal of this study was to analyze these two copolymers using different methodologies of fractionation to obtain EPR and iPP crystalline fractions, and evaluated the influence the itaconic acid in the microstructure of polymers and if the acid have preferably to incorporate in one of the phases, the rubber phase or crystalline phase . The DSC results showed the presence of new chain segments with different Tm and Tc after the grafting reaction, peaks at 118 and 104 ºC, respectively, these peaks did not exist in the pure sample (PC 0).

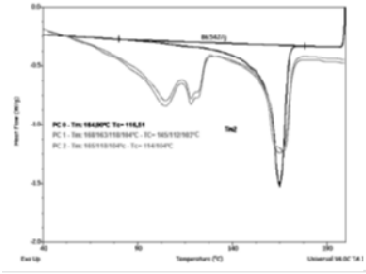

Figure 1: DSC profile sample PP sample (PC0), PP-g-AIt with 0,4% AIt (PC1), PP-g-Ait with 0,6% AIt (PC2)

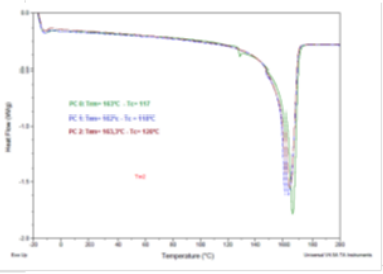

Figure 2: DSC profile phase crystatlinity PP (PC0),PP-g-AIt with 0.4% AIt (PC1), PP-g-Ait with 0,6%

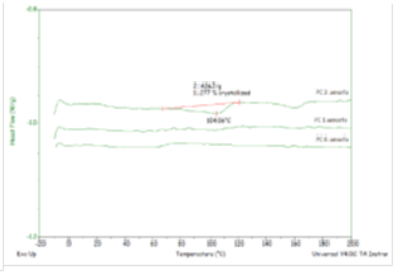

Figure 3: DSC profile phase amorphous PP (PC0),PP-g-AIt with 0.4% AIt (PC1), PP-g-Ait with 0,6%

In DSC analysis of crystalline fractions (Figure 2) and amorphous (Figure 3) was not detected the presence of the intermediate melting peak between 118 and 104ºC (Tm), we conclude that the interaction between the amorphous and crystalline phase after the addition of acid original new segments with intermediate melting temperature between the two phases.

References

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