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Development of isosorbide based bio-plasticizers and their application to thermoplastic copolyester elastomers(TPEEs)

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Thermoplastic elastomers(TPEs) are block copolymers prepared by chemical reactions or physical blending. They generally have two phases, where one part is rubber (soft phase) and another part is plastic (hard phase), which is an essential feature of all TPEs. The most important advantages of TPEs are their versatility to provide some elastomeric properties like rubbers, easy processing, and recyclability like thermoplastics. In last few decades, TPEs have been practically employed in different applications in plastic industry, specifically where high toughness and failure strain were required. Especially PLA based thermoplastic vulcanizates(TPVs) were plasticized to increase the ductility of the TPVs with well-known bio based plasticizers such as tributyl citrate (TBC), tributyl acetyl citrate (TBAC). However, to the best of our knowledge, there was no literature about applying plasticizers on thermoplastic copolyester elastomers(TPEEs). In this study, a novel and efficient bio-based plasticizer composition, based on isosorbide and D-sorbitol, was synthesized and their plasticizing effects on TPEEs were investigated by means of glass transition temperatures, mechanical properties, hardness test, thermal behaviors, and volatility properties. The commercial petroleum based plasticizer, dioctyl terephthalate (DOTP), was used for parallel comparison

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