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COMPAIRING THE EFFECT OF SB AND TI BASED CATALYSTS ON INCREASING THE MOLECULAR WEIGHT OF THE SYNTHESIED POLY (TRIMETHYLENE TEREPHTHALATE)

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Poly(trimethylene terephthalate) (PTT) is a newly commercialized thermoplastic polyester, and unifies the main properties of nylon and other polyester for the most disparate applications, such as carpet fiber and engineering plastics. Furthermore, PTT can also be used in blends with other elastic fibers such as polyurethane-, polyester-, or polyether-based fiber. PTT fiber has been considered to be one of the most important [1].

PTT is a relatively new semicrystalline thermoplastic polyester, since one of its monomer propyleneglycol or 1,3-propanediol (1,3-PDO) was not available in sufficient quantity and purity in the past. However, in recent years, more attractive processes have been developed for the production of 1,3-PDO including selective hydration of acrolein, followed by catalytic hydrogenation of the intermediate 3-hydroxypropionaldehyde and hydroformylation of ethylene oxide[2,3]. Currently, Du Pont's fiber-grade or apparel-grade 1,3-PDO has successfully been prepared by a fermentation process based on corn sugar, a renewable resource [4]. Shell also announced the production of 1,3-PDO via an enzymic fermentation of glycerine [5]. The main application field of poly(trimethylene terephthalate) is that of fibers, because it combines the advantageous properties of polyamides and polyesters. PTT fibers are distinguished for their high elasticity, excellent recovery rate, excellent dyeing in boiling water without carriers, stain resistance, high UV stability, low water absorption and low electrostatic charging

In the present research poly(trimethylene terephthalate) was synthesized in a two steps process in laboratory scale reactor. In the first step, pure terephthalic acid (TPA) was esterified with 1,3-propanediol (1,3-PDO). In the second, mixture went under polycondensation step. Two different catalysts were used. Tetra buthyl titanate, $Ti(OC_4H_9)_4$, and antimouny oxide, Sb_2O_3, were added in the beginning of the reaction. Vapor was condensated and measured during the esterification reaction time that is an indication of reaction extent. FTIR spectroscopy was used to study the microstructure of polyester. Molecular weight of polymer was measured by means of HNMR and dilute solution viscometry.