

PREPARATION OF POLY(BUTYLENE TEREPHTHALATE) POWDERS BY MELT EXTRUSION WITH BLOCK COPOLYMER ADDITIVES

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ABSTRACT

We report a process for preparing poly(butylene terephthalate) (PBT) powders of diameter smaller than 100 μm in quantitative yield using amphiphilic block copolymer additives in an extrusion-phase inversion process.¹ Poly(benzyl acrylate)-based block copolymers of controlled M_n and composition were prepared by RAFT polymerization² and their performances as processing aids for making PBT powders were evaluated. For several copolymers of the series, SEM and DLS analysis confirmed that monodisperse PBT particles with spherical morphology were obtained (Fig. 1). Experimental results were in good agreement with predictive models of phase inversion for binary mixtures of polymers. It was shown that the viscosity ratio between the two phases is the main factor controlling the average size of PBT droplets dispersed in the continuous matrix formed by the additive. The average diameter of PBT particles was comprised between 10 and 100 μm and increased with the viscosity ratio between the two phases. It was also possible to correlate the PBT particle size and some structural parameters of the block copolymer additive, e.g. its hydrophilic-lipophilic balance. An increase of the weight fraction of the hydrophilic block in the block copolymer led to particles of smaller diameter.

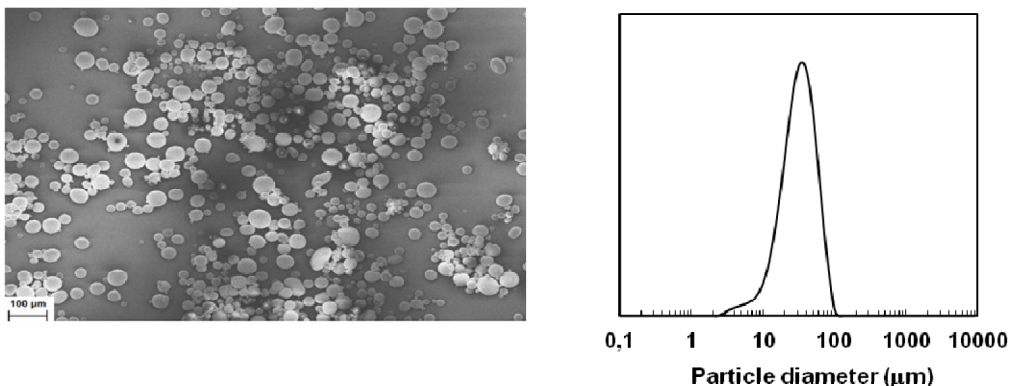


Fig. 1: PBT powders from melt extrusion-phase inversion process with a poly(benzyl acrylate)-poly(N,N-dimethyl acrylamide) diblock copolymer additive of general structure PBzA₂₀₀₀-PDMA₈₀₀₀. Yield=100%. d_{50} =32 μm .

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References:

¹ Sandeau, A.; Destarac, M.; Mazières, S.; Vergelati, C.; Corriol, C. Fr 2988727, Rhodia Operations / CNRS (Oct. 4 2013). Method for preparation of particles containing a (semi)aromatic polyester and powders thus obtained.

² Moad, G.; Rizzardo, E.; Thang, S.H. *Aust. J. Chem.* **2012**, *65*, 985-1076.