Abstract

Process Economics Program Report No. 141A

POLYETHYLENE TEREPTHALATE BOTTLES AND BOTTLE RESINS
(May 1993)

PET bottles are manufactured from PET bottle-grade resin by a sequential injection molding and blow-molding process. The bottle-grade resin, which is characterized by a high molecular weight (e.g. an intrinsic viscosity (IV) of 0.72-0.84) and low acetaldehyde content (e.g., <3 ppm), is made by solid-state polymerization of the lower molecular weight (e.g., IV 0.6) PET, which is made by melt-phase polymerization. The demand for PET bottles and containers in the last decade has grown remarkably. For example, since 1980 the plant capacity in the United States for PET solid state resin has almost tripled, and now stands at about 2 billion lb/yr (900,000 t/yr).

This report provides preliminary process designs and cost estimates for the production of polyethylene terephthalate (PET) by melt-phase polymerization, the conversion of this PET to bottle-grade PET by solid-state polymerization, and conversion of the bottle-grade PET into one-piece 2-liter beverage bottles by the two-stage injection molding/blow-molding process. The report also includes reviews of the pertinent patents on the various manufacturing processes, a section on the current status of the industry, and a section that briefly summarizes the chemistry and technology of the manufacturing processes.

The report is useful for manufacturers that are considering entering this business or for manufacturers that are considering vertical integration.
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