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(54) **Title**: HIGH MELT STRENGTH POLYESTERS FOR FOAM APPLICATIONS

(57) **Abstract**: The present invention relates to a branched polyethylene terephthalate-*co*-isophthalate for use in the manufacture of foamed articles. The branched polyethylene terephthalate-*co*-isophthalate can be characterized by a composition comprising i) a polyethylene terephthalate-co-isophthalate comprising from about 5 to about 15 weight % of an isophthalic acid, and ii) a branching agent comonomer, wherein the branching agent comonomer is a polyhydric alcohol having functionality of 3 or more and the polyhydric alcohol is present in an amount of from 0.005 to about 0.01 equivalents per mole of total diacids. Other embodiments of the present invention include foamed articles produced from these compositions and processes to produce these compositions and the foamed articles.

AMENDED CLAIMS
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What is claimed is:

1. A composition comprising: i) a polyethylene terephthalate-co-isophthalate comprising from about 5 to about 15 weight % of an isophthalic acid, and ii) a branching agent comonomer, wherein said branching agent comonomer is a polyhydric alcohol having functionality of 3 or more and the polyhydric alcohol is present in an amount of from about 0.005 to about 0.01 equivalents per mole of total diacids.

2. The composition of claim 1 wherein said branching agent comonomer is a polyhydric alcohol having functionality of 4 or more.

3. The composition of claim 1 wherein said polyethylene terephthalate-co-isophthalate has an intrinsic viscosity in dichloroacetic acid at 25° C of about 0.85 to about 1.5 dl/g.

4. The composition of claim 1 wherein the weight average molecular is about 75,000 g/mole or greater.

5. The composition of claim 1 wherein the ratio of the melt flow index at 310° C with a load of 2.06 kg to the weight average molecular weight is about 2×10^{-4} or less.

6. The composition of claim 1 wherein said polyhydric alcohol comprises at least one member selected from the group consisting of glycerol, trimethylol propane, trimethylol ethane, pentaerythritol or ester thereof, dipentaerythritol, tripentaerythritol, ethoxylated derivatives of this group, and mixtures thereof.

7. The composition of claim 1 further comprising an additive.

8. The composition of claim 7 wherein said additive comprises at least one member selected from the group consisting of carbon black, silica gel, alumina, clays, chopped fiber glass, antioxidants, flame retardants, lubricants, toughenners, light stabilizers, plasticizers, pigments, barrier resins, nucleating agents and mixtures thereof.

9. A method for producing a copolyester comprising:

a. melt polymerizing i) terephthalic and isophthalic acid, or their ester derivates, ii) ethylene glycol, and iii) a polyhydric alcohol to form a copolyester comprising about 5 to about 15 mole % isophthalic acid and about 0.005 to about 0.01 equivalents of polyhydric alcohol having an intrinsic viscosity of about 0.65 g/dl;

b. extruding said copolyester into a water bath, quenching and cutting the solid extrudate into pellets; and

c. crystallizing and solid state polymerizing pellets to an intrinsic viscosity of about 0.85 to about 1.5 dl/g.

10. A method for producing a foamed article comprising:

a. blending a branched polyethylene terephthalate-co-isophthalate copolyester having an isophthalic acid content of about 5 to about 15 mole % and a branching agent content from about 0.005 to about 0.01 equivalents/mole of total acids and an intrinsic viscosity of about 0.85 to about 1.5 dl/g with additives, wherein the branching agent is a polyhydric alcohol having a functionality of 3 or more;

b. melting the blend in an extruder;

c. adding a blowing agent to the molten mixture; and

d. extruding the resultant mixture to obtain a foamed article.

11. The composition of claim 10 wherein said additive comprises at least one member selected from the group consisting of carbon black, silica gel, alumina, clays, chopped fiber glass, antioxidants, flame retardants, lubricants, toughenerS, light stabilizers, plasticizers, pigments, barrier resins, nucleating agents and mixtures thereof.

12. A foamed article comprising a branched polyethylene terephthalate-co-isophthalate copolyester having an isophthalic content of about 5 to about 15 mole % and a branching agent content from about 0.005 to about 0.01 equivalents/mole of total acids and an intrinsic viscosity of about 0.85 to about 1.5 dl/g and additives, wherein the branching agent is a polyhydric alcohol having a functionality of 3 or more.

13. The foamed article of claim 12 wherein the article is a selected from the group consisting of a sheet for insulation, thermoformed tray and other shapes for industrial end uses.