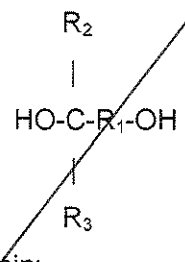
CLAIMS

1. A copolyester from between 30 and 50 mol % of a first monomer being an isohexide; between 40 and 60 mol % of a second monomer being an aromatic dicarboxylic acid or a cycloaliphatic dicarboxylic acid; and between 1 and 20 mol % of a third monomer being an aliphatic diol, the copolyester having an acid number of between 10 and 50.

2. Copolyester according to claim 1, wherein the isohexide is isosorbide.

3. Copolyester according any one of claims 1-2, wherein the second monomer is a cycloaliphatic dicarboxylic acid having a ring comprising between 4 and 12 carbon atoms and optionally one or more heteroatoms, the cycloaliphatic dicarboxylic acid preferably being cyclohexane dicarboxylic acid, more preferably 1,4 cyclohexanedicarboxylic acid.

4. Copolyester according to any one of claims 1-3, wherein the third monomer is a diol having the following general formula:



wherein:

- R_1 is an optionally substituted bifunctional group comprising between 1-13 carbon atoms and optionally one or more heteroatoms;
- R_2 and R_3 are independently selected from -H and an optionally substituted alkyl group comprising between 1 and 12 carbon atoms and optionally one or more heteroatoms.

5. Copolyester according to claim 4, wherein R_1 is selected from the group consisting of $-CH_2-$, $-CH_2-CH_2-$, $-CH(CH_3)-CH_2-$, $-C(CH_3)_2-CH_2-$, $-CH(C_2H_5)-CH_2-$, $-C(C_2H_5)_2-CH_2-$ and $-C(CH_3)(C_2H_5)-CH_2-$; R_2 is selected from the group

consisting of -H, $-CH_3$ and $-C_2H_5$; and R_3 is a linear alkyl group comprising between 2 and 14 carbon atoms.

6. Copolyester according to any one of the preceding claims, obtainable by reacting 42 mol % of the first monomer being isosorbide, 50 mol % of the second monomer being 1,4 cyclohexanedicarboxylic acid and 8 mol % of the third monomer being selected from the group consisting of 1,2-ethanediol; 2,2-diethyl-1,3-propanediol; 1,2-hexanediol; 1,2-decanediol; 1,2-dodecanediol; and 1,2-tetradecanediol.

7. Copolyester according to any one of the preceding claim having a number average molecular weight (Mn) of between 1000 and 10000 g/mol and a weight average molecular weight (Mw) of between 1500 and 30000 g/mol.

8. A process for preparing a copolyester according to any one of claims 1-7 comprising the steps of:
   a. bringing between 30 and 50 mol % of a first monomer being an isohexide; between 40 and 60 mol % of a second monomer being an aromatic dicarboxylic acid or a cycloaliphatic dicarboxylic acid; and between 1 and 20 mol % of a third monomer being a branched aliphatic diol in a reactor under an inert atmosphere;
   b. heating the mixture to a temperature of between 150°C and 200°C until the mixture obtained in step a has melted;
   c. adding a condensation catalyst in an amount up to 1 mol% with respect to the mixture obtained in step a;
   d. stirring the reaction mixture for at least 1 hour at a temperature of between 200°C and 300°C;
   e. removing the obtained reaction water;
   f. stirring the reaction mixture for at least another hour at a temperature of between 200°C and 300°C and under vacuum;
   g. cooling the reaction product under an inert atmosphere to room temperature.

9. A copolyester obtainable by a process according to claim 8, the copolyester having an acid number of between 10 and 50.

10. A latex composition comprising water as a medium and between 10 and 50 wt% particles of a copolyester according to any one of claims 1-7 or 9 dispersed in the medium, the particles having an average diameter of between 10 and 1000 nm.

11. Latex composition according to claim 10, further comprising a cosolvent and/or a surface tension modifying agent.

12. Latex composition according to any one of claims 10-11, further comprising a colorant.

13. A process for preparing a latex composition according to any one of claims 10-12, comprising the steps of:

i. dissolving a copolyester resin according to any one of the claims 1-8 having an acid number of between 10 and 50 in a water-soluble solvent, whereby the weight ratio of resin to solvent ranges between 0.1 and 2.5;

ii. adding a deprotonating agent, being a water-soluble base, preferably selected from the group consisting of triethylamine, triethanolamine, ammonium hydroxide, sodium hydroxide, potassium hydroxide and sodium carbonate to the mixture in an amount such that the molar amount of deprotonating groups ranges between 0.5 and 1.5 times the molar amount KOH necessary to determine the acid number of the polyester resin;

iii. heating the mixture obtained in step ii to a temperature of between 35°C and 90°C;

iv. separately heating an amount of water to a temperature substantially equal to the temperature of step iii, the amount of water being in the range of between 2 and 6 times the weight of the polyester resin;

v. adding the water obtained in step iv to the mixture obtained in step iii under vigorous stirring at a speed of between 1600 and 2200 rpm;

vi. removing the solvent by distillation.

14. Process according to claim 13 further comprising the steps of:

vii. adding a colorant, preferably in the form of a dispersion comprising between 10 and 30 wt% of at least one pigment to the latex obtained in step vi;

viii. adding between 0.1 and 5 wt% with respect to the total latex composition of a surface tension modifying agent, preferably selected from the group consisting of Triton X-100, dioctyl sodium sulphosuccinate, sodium dodecyl sulphate and polysiloxane based surfactants.

ix. optionally adding water;

x. adding between 0 and 40 wt% with respect to the total latex composition of a cosolvent, the cosolvent being a small water-soluble organic di- or triol preferably selected from the group consisting of: ethyleneglycol, diethylene glycol butyl ether, dipropyleneglycol-monomethylether, glycerol, 1,2-propanediol, 2-pyrrolidone and tetraethyleneglycol;

xi. stirring the mixture obtained in step x for between 5 and 20 minutes.

wherein the obtained latex composition comprises between 1 and10 wt% of the colorant and wherein the weight ratio of resin to colorant is between 0.5 and 3.0.

15. Ink composition comprising a latex composition according to any one of the claims 10-12 or as obtained according to a process according to any one of claims 13-14.

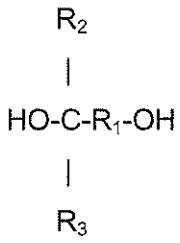
CLAIMS

1. A copolyester from between 30 and 50 mol % of a first monomer being an isohexide; between 40 and 60 mol % of a second monomer being a cycloaliphatic dicarboxylic acid; and between 1 and 20 mol % of a third monomer being an aliphatic diol, the copolyester having an acid number of between 10 and 50.

2. Copolyester according to claim 1, wherein the isohexide is isosorbide.

3. Copolyester according any one of claims 1-2, wherein the second monomer is a cycloaliphatic dicarboxylic acid having a ring comprising between 4 and 12 carbon atoms and optionally one or more heteroatoms, the cycloaliphatic dicarboxylic acid preferably being cyclohexane dicarboxylic acid, more preferably 1,4 cyclohexanedicarboxylic acid.

4. Copolyester according to any one of claims 1-3, wherein the third monomer is a diol having the following general formula:



wherein:

- R_1 is an optionally substituted bifunctional group comprising between 1-13 carbon atoms and optionally one or more heteroatoms;
- R_2 and R_3 are independently selected from -H and an optionally substituted alkyl group comprising between 1 and 12 carbon atoms and optionally one or more heteroatoms.

5. Copolyester according to claim 4, wherein R_1 is selected from the group consisting of $-CH_2-$, $-CH_2-CH_2-$, $-CH(CH_3)-CH_2-$, $-C(CH_3)_2-CH_2-$, $-CH(C_2H_5)-CH_2-$, $-C(C_2H_5)_2-CH_2-$ and $-C(CH_3)(C_2H_5)-CH_2-$; R_2 is selected from the group

consisting of -H, $-CH_3$ and $-C_2H_5$; and R_3 is a linear alkyl group comprising between 2 and 14 carbon atoms.

6. Copolyester according to any one of the preceding claims, obtainable by reacting 42 mol % of the first monomer being isosorbide, 50 mol % of the second monomer being 1,4 cyclohexanedicarboxylic acid and 8 mol % of the third monomer being selected from the group consisting of 1,2-ethanediol; 2,2-diethyl-1,3-propanediol; 1,2-hexanediol; 1,2-decanediol; 1,2-dodecanediol; and 1,2-tetradecanediol.

7. Copolyester according to any one of the preceding claim having a number average molecular weight (Mn) of between 1000 and 10000 g/mol and a weight average molecular weight (Mw) of between 1500 and 30000 g/mol.

8. A process for preparing a copolyester according to any one of claims 1-7 comprising the steps of:
   a. bringing between 30 and 50 mol % of a first monomer being an isohexide; between 40 and 60 mol % of a second monomer being an aromatic dicarboxylic acid or a cycloaliphatic dicarboxylic acid; and between 1 and 20 mol % of a third monomer being a branched aliphatic diol in a reactor under an inert atmosphere;
   b. heating the mixture to a temperature of between 150°C and 200°C until the mixture obtained in step a has melted;
   c. adding a condensation catalyst in an amount up to 1 mol% with respect to the mixture obtained in step a;
   d. stirring the reaction mixture for at least 1 hour at a temperature of between 200°C and 300°C;
   e. removing the obtained reaction water;
   f. stirring the reaction mixture for at least another hour at a temperature of between 200°C and 300°C and under vacuum;
   g. cooling the reaction product under an inert atmosphere to room temperature.

9. A copolyester obtainable by a process according to claim 8, the copolyester having an acid number of between 10 and 50, and wherein the second monomer is a cycloaliphatic dicarboxylic acid.

10. A latex composition comprising water as a medium and between 10 and 50 wt% particles of a copolyester according to any one of claims 1-7 or 9 dispersed in the medium, the particles having an average diameter of between 10 and 1000 nm.

11. A latex composition comprising water as a medium and between 10 and 50 wt% particles of a copolyester according to any one of claims 1-7 or a copolyester obtainable by a process according to claim 8, the copolyester having an acid number of between 10 and 50, the particles being dispersed in the medium, the particles having an average diameter of between 10 and 1000nm, the latex composition further comprising a cosolvent and/or a surface tension modifying agent.

12. Latex composition according to any one of claims 10-11, further comprising a colorant.

13. A process for preparing a latex composition according to any one of claims 10-12, comprising the steps of:

i. dissolving a copolyester resin according to any one of the claims 1-8 having an acid number of between 10 and 50 in a water-soluble solvent, whereby the weight ratio of resin to solvent ranges between 0.1 and 2.5;

ii. adding a deprotonating agent, being a water-soluble base, preferably selected from the group consisting of triethylamine, triethanolamine, ammonium hydroxide, sodium hydroxide, potassium hydroxide and sodium carbonate to the mixture in an amount such that the molar amount of deprotonating groups ranges between 0.5 and 1.5 times the molar amount KOH necessary to determine the acid number of the polyester resin;

iii. heating the mixture obtained in step ii to a temperature of between 35°C and 90°C;

iv. separately heating an amount of water to a temperature substantially equal to the temperature of step iii, the amount of water being in the range of between 2 and 6 times the weight of the polyester resin;

v. adding the water obtained in step iv to the mixture obtained in step iii under vigorous stirring at a speed of between 1600 and 2200 rpm;

vi. removing the solvent by distillation.

14. Process according to claim 13 further comprising the steps of:

vii. adding a colorant, preferably in the form of a dispersion comprising between 10 and 30 wt% of at least one pigment to the latex obtained in step vi;

viii. adding between 0.1 and 5 wt% with respect to the total latex composition of a surface tension modifying agent, preferably selected from the group consisting of octylphenolethoxylate surfactants, dioctyl sodium sulphosuccinate, sodium dodecyl sulphate and polysiloxane based surfactants.

ix. optionally adding water;

x. adding between 0 and 40 wt% with respect to the total latex composition of a cosolvent, the cosolvent being a small water-soluble organic di- or triol preferably selected from the group consisting of: ethyleneglycol, diethylene glycol butyl ether, dipropyleneglycol-monomethylether, glycerol, 1,2-propanediol, 2-pyrrolidone and tetraethyleneglycol;

xi. stirring the mixture obtained in step x for between 5 and 20 minutes.

wherein the obtained latex composition comprises between 1 and10 wt% of the colorant and wherein the weight ratio of resin to colorant is between 0.5 and 3.0.

15. Ink composition comprising a latex composition according to any one of the claims 10-12 or as obtained according to a process according to any one of claims 13-14.