the particles in contact with an organic medium that disperses the rubber particles.

[023] The document WO2019/011984 discloses a resin composition. The resin composition comprises a resin system, a curative system and a particle system. The particle system is a multistage polymer.

[024] None of the prior art documents discloses a composition or a process as claimed.

[Brief description]

[024a] In an aspect, there is provided a composition (PC1) comprising

a) a multistage polymer (MP1) comprising

a1) one stage (SA1) comprising a polymer (A1) having a glass transition temperature of less than 10°C

a2) one stage (SA2) comprising a polymer (A2) having a glass transition temperature of at least 60°C and

b) a thermoplastic polymer (B1) having a glass transition temperature of at least 30°C and

c) a component (LC1) comprising a compound (C1) with at least two polymerizable groups (PG1) and (PG2)

characterized in that the polymer (B1) has a mass average molecular weight Mw of between 10 000g/mol and 500 000g/mol and that the component b) represents at most 40wt% of a composition based on a), and b) only and the sum of components a) and b) is between 0.5phr and 100phr for 100phr of component c) and characterized in that the compound (C1) is a vinyl ester or an unsaturated polyester.

[024b] In another aspect, there is provided a method of manufacturing a composition (PC1) as defined above comprising the steps of

i) providing a composition (Ci) comprising

a) a multistage polymer (MP1) comprising

a1) one stage (SA1) comprising a polymer (A1) having a glass transition temperature of less than 10°C

a2) one stage (SA2) comprising a polymer (A2) having a glass transition temperature of at least 60°C and

b) a thermoplastic polymer (B1) having a glass transition temperature of at least 30°C and a mass average molecular weight Mw of between 10 000g/mol and 500 000g/mol so that the component b) represents at most 40wt% of a composition based on a) and b);

and

ii) mixing the composition (Ci) with a composition (Ciia) comprising at least one other component or compound present in the composition (PC1); and

iii) optionally mixing the composition obtained in step ii) with the other components or compounds present in the composition (PC1) that have not been added yet in step ii).

[024c] In another aspect, there is provided a method of manufacturing the composition (PC1) as defined above comprising the steps of

i) providing a polymeric composition (Ci) comprising

a) a multistage polymer (MP1) comprising

a1) one stage (SA1) comprising a polymer (A1) having a glass transition temperature of less than 10°C

a2) one stage (SA2) comprising a polymer (A2) having a glass transition temperature of at least 60°C and

b) a thermoplastic polymer (B1) having a glass transition temperature of at least 30°C and a mass average molecular weight Mw of between 10 000g/mol and 500 000g/mol so that the component b) represents at most 40wt% of a composition based on a) and b),

ii) providing a composition (Ciib) comprising c) a component (LC1) comprising a compound (C1) with at least two polymerizable groups (PG1) and (PG2), and characterized in that the compound (C1) is a vinyl ester or an unsaturated polyester,

iii) mixing the compositions (Ci) and (Ciib) comprising the components a), b) and c) in a ratio that the sum of components a) and b) is between 0.5phr and 100phr for 100phr of component c).

[024d] In another aspect, there is provided a method of reducing the preparation time of a composition (PC1) comprising the steps of

i) providing a polymeric composition (Ci) comprising

a) a multistage polymer (MP1) comprising

a1) one stage (SA1) comprising a polymer (A1) having a glass transition temperature of less than 10°C

a2) one stage (SA2) comprising a polymer (A2) having a glass transition temperature of at least 60°C and

b) a thermoplastic polymer (B1) having a glass transition temperature of at least 30°C and a mass average molecular weight Mw of between 10 000g/mol and 500 000g/mol so that the component b) represents at most 40wt% of a composition based on a) and b),

ii) providing a composition (Ciib) comprising c) a component (LC1) comprising a compound (C1) with at least two polymerizable groups (PG1) and (PG2), and characterized in that the compound (C1) is a vinyl ester or an unsaturated polyester,

iii) mixing the compositions (Ci) and (Ciib) comprising the components a), b) and c) in a ratio so that the sum of components a) and b) is between 0.5 and 100phr for 100phr of component c).

[024e] In another aspect, there is provided a method of manufacturing the composition (PC1) as defined above comprising the steps of

i) providing a polymeric composition comprising

a) a multistage polymer (MP1) comprising

a1) one stage (SA1) comprising a polymer (A1) having a glass transition temperature of less than 10°C

a2) one stage (SA2) comprising a polymer (A2) having a glass transition temperature of at least 60°C and

b) a thermoplastic polymer (B1) having a glass transition temperature of at least 30°C,

ii) providing c) a component (LC1) comprising a compound (C1) with at least two polymerizable groups (PG1) and (PG2), and characterized in that the compound (C1) is a vinyl ester or an unsaturated polyester,

iii) mixing the components a), b) and c).

[024f] In another aspect, there is provided the use of the composition as defined above or obtained by the method as defined above to prepare an impact modified polymeric composition (PC2).

[024g] In another aspect, there is provided a polymeric composition (PC2) comprising

a) a multistage polymer (MP1) comprising

a1) one stage (SA1) comprising a polymer (A1) having a glass transition temperature of less than 10°C,

a2) one stage (SA2) comprising a polymer (A2) having a glass transition temperature of at least 60°C and

b) a thermoplastic polymer (B1) having a glass transition temperature of at least 30°C and

c) a polymer (P2) comprising units from a compound (C1) with at least two polymerizable groups (PG1) and (PG2), and characterized in that the compound (C1) is a vinyl ester or an unsaturated polyester,

characterized in that the polymer (B1) has a mass average molecular weight Mw of between 10 000g/mol and 500 000g/mol and that the component b) represents at most 40wt% of a composition based on a), and b) only and the sum of components a) and b) is between 0.5phr and 100phr for 100phr of component c).

[024h] In another aspect, there is provided the use of the polymeric composition (PC2) as defined above as an adhesive and more preferably a structural adhesive or in a polymeric composite; or in applications as coating, decorative casting, flooring, polymer concrete, solid surfaces, artificial marble, or in marine applications, building and construction, wind energy applications.

[025] Surprisingly it has been found that a composition (PC1) comprising

a) a multistage polymer (MP1) comprising

a1) one stage (SA1) comprising a polymer (A1) having a glass transition temperature of less than 10°C

a2) one stage (SA2) comprising a polymer (A2) having a glass transition temperature of at least 60°C and

Claims

1. A composition (PC1) comprising
   a) a multistage polymer (MP1) comprising
      a1) one stage (SA1) comprising a polymer (A1) having a glass transition temperature of less than 10°C
      a2) one stage (SA2) comprising a polymer (A2) having a glass transition temperature of at least 60°C and
   b) a thermoplastic polymer (B1) having a glass transition temperature of at least 30°C and
   c) a component (LC1) comprising a compound (C1) with at least two polymerizable groups (PG1) and (PG2)
   characterized in that the polymer (B1) has a mass average molecular weight Mw of between 10 000g/mol and 500 000g/mol and that the component b) represents at most 40wt% of a composition based on a), and b) only and the sum of components a) and b) is between 0.5phr and 100phr for 100phr of component c) and characterized in that the compound (C1) is a vinyl ester or an unsaturated polyester.

2. The composition according to claim 1, characterized in that the polymer (B1) is a (meth)acrylic polymer.

3. The composition according to claim 1 or 2, characterized in that the polymer (B1) comprises at least 70wt% monomers chosen from C1 to C12 alkyl (meth)acrylates.

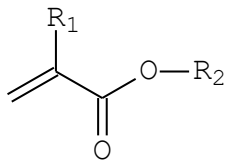
4. The composition according to any of claims 1 to 3, characterized in that the sum of components a) and b) is between 1phr and 15phr for 100phr of component c).

5. The composition according to any of claims 1 to 3, characterized in that the sum of components a) and b) is between 15phr and 100phr for 100phr of component c).

6. The composition according to any of claims 1 to 3, characterized in that the sum of components a) and b) is between 21phr and 100phr for 100phr of component c).

7. The composition according to any of claims 1 to 3, characterized in that the sum of components a) and b) is between 50phr and phr for 100phr of component c).

8. The composition according to any of claims 1 to 7, characterized in that the the polymer (B1) comprises a functional comonomer having the formula (1)



(1)

wherin R_1 is chosen from H or CH_3 and R_2 is H or an aliphatic or aromatic radical having at least one atom that is not C or H.

9. The composition according to any of claims 1 to 8, characterized in that the component (LC1) is a liquid having a viscosity between 0.5mPa*s and 10Pa*s at 25°C.

10. The composition according to any of claims 1 to 9, characterized in that component (LC1) additionally comprises a monomer (M1) or a mixture of monomers (Mx).

11. The composition according to claim 10, characterized in that the monomer (M1) or the mixture of monomers (Mx) comprises no styrene based monomers.

12. The composition according to any of claims 1 to 11, characterized in that the compound (C1) is a vinyl ester.

13. The composition according to any of claims 1 to 11, characterized in that the compound (C1) is an unsaturated polyester.

14. The composition according to any of claims 1 to 7, characterized in that the component b) represents between 10wt% and 20wt% of a composition based on a) and b) only.

15. A method for manufacturing a composition (PC1) according to any of claims 1 to 14 comprising the steps of

i) providing a composition (Ci) comprising

a) a multistage polymer (MP1) comprising

a1) one stage (SA1) comprising a polymer (A1) having a glass transition temperature of less than 10°C

a2) one stage (SA2) comprising a polymer (A2) having a glass transition temperature of at least 60°C and

b) a thermoplastic polymer (B1) having a glass transition temperature of at least 30°C and a mass average molecular weight Mw of between 10 000g/mol and 500 000g/mol so that the component b) represents at most 40wt% of a composition based on a) and b);

and

ii) mixing the composition (Ci) with a composition (Ciia) comprising at least one other component or compound present in the composition (PC1); and

iii) optionally mixing the composition obtained in step ii) with the other components or compounds present in the composition (PC1) that have not been added yet in step ii).

16. A method of manufacturing the composition (PC1) according to any of claims 1 to 14 comprising the steps of

i) providing a polymeric composition (Ci) comprising

a) a multistage polymer (MP1) comprising

a1) one stage (SA1) comprising a polymer (A1) having a glass transition temperature of less than 10°C

a2) one stage (SA2) comprising a polymer (A2) having a glass transition temperature of at least 60°C and

b) a thermoplastic polymer (B1) having a glass transition temperature of at least 30°C and a mass

average molecular weight Mw of between 10 000g/mol and 500 000g/mol so that the component b) represents at most 40wt% of a composition based on a) and b),

ii) providing a composition (Ciib) comprising c) a component (LC1) comprising a compound (C1) with at least two polymerizable groups (PG1) and (PG2), and characterized in that the compound (C1) is a vinyl ester or an unsaturated polyester,

iii) mixing the compositions (Ci) and (Ciib) comprising the components a), b) and c) in a ratio that the sum of components a) and b) is between 0.5phr and 100phr for 100phr of component c).

17. A method of reducing the preparation time of a composition (PC1) comprising the steps of

i) providing a polymeric composition (Ci) comprising

a) a multistage polymer (MP1) comprising

a1) one stage (SA1) comprising a polymer (A1) having a glass transition temperature of less than 10°C

a2) one stage (SA2) comprising a polymer (A2) having a glass transition temperature of at least 60°C and

b) a thermoplastic polymer (B1) having a glass transition temperature of at least 30°C and a mass average molecular weight Mw of between 10 000g/mol and 500 000g/mol so that the component b) represents at most 40wt% of a composition based on a) and b),

ii) providing a composition (Ciib) comprising c) a component (LC1) comprising a compound (C1) with at least two polymerizable groups (PG1) and (PG2), and characterized in that the compound (C1) is a vinyl ester or an unsaturated polyester,

iii) mixing the compositions (Ci) and (Ciib) comprising the components a), b) and c) in a ratio so that the sum of components a) and b) is between 0.5 and 100phr for 100phr of component c).

18. The method according to any of claims 15 to 17, characterized in that the composition (Ciia) and (Ciib) comprises:
- a polyepoxide or
- a polyepoxid and organic acid with a double bond or
- a vinylester or
- a vinylester and monomer (M1) or the mixture of monomers (Mx)
- unsaturated polyester or
- unsaturated polyester and monomer (M1) or the mixture of monomers (Mx).

19. A method of manufacturing the composition (PC1) according to any of claims 1 to 14 comprising the steps of
i) providing a polymeric composition comprising
a) a multistage polymer (MP1) comprising
a1) one stage (SA1) comprising a polymer (A1) having a glass transition temperature of less than 10°C
a2) one stage (SA2) comprising a polymer (A2) having a glass transition temperature of at least 60°C and
b) a thermoplastic polymer (B1) having a glass transition temperature of at least 30°C,
ii) providing c) a component (LC1) comprising a compound (C1) with at least two polymerizable groups (PG1) and (PG2), and characterized in that the compound (C1) is a vinyl ester or an unsaturated polyester,
iii) mixing the components a), b) and c).

20. The method according to any of claims 15 to 19, characterized in that the multistage polymer (MP1) provided is in form of a polymer powder having a total intruded volume of at least 1.2 ml/g as measured by mercury porosimetry.

21. Use of the composition according to any of claims 1 to 14 or obtained by the method according to any of claims 15 to 20 to prepare an impact modified polymeric composition (PC2).

22. A polymeric composition (PC2) comprising

a) a multistage polymer (MP1) comprising

a1) one stage (SA1) comprising a polymer (A1) having a glass transition temperature of less than 10°C,

a2) one stage (SA2) comprising a polymer (A2) having a glass transition temperature of at least 60°C and

b) a thermoplastic polymer (B1) having a glass transition temperature of at least 30°C and

c) a polymer (P2) comprising units from a compound (C1) with at least two polymerizable groups (PG1) and (PG2), and characterized in that the compound (C1) is a vinyl ester or an unsaturated polyester,

characterized in that the polymer (B1) has a mass average molecular weight Mw of between 10 000g/mol and 500 000g/mol and that the component b) represents at most 40wt% of a composition based on a), and b) only and the sum of components a) and b) is between 0.5phr and 100phr for 100phr of component c).

23. Use of the polymeric composition (PC2) according to claim 22 as an adhesive and more preferably a structural adhesive or in a polymeric composite; or in applications as coating, decorative casting, flooring, polymer concrete, solid surfaces, artificial marble, or in marine applications, building and construction, wind energy applications.