layer (A) comprising polymer (A1) having a glass transition temperature of less then 0°C,
b) polymerizing by emulsion polymerization in presence of the polymer obtained in step a) of a monomer or monomer mixture (B_m) to obtain during this subsequent stage a layer (B) comprising a polymer (B1) having a glass transition temperature of at least 45°C,
c) coagulating the multistage polymer with an alkali metal salt,
d) washing the multistage polymer,
e) adjusting the pH value after the coagulation to a value between 5 to 10,
f) addition of an aqueous solution or dispersion comprising a phosphorous containing compound wherein the phosphorous has the oxidation stage of +III or +V,
characterized in that the polymer composition comprises at least 350 ppm of phosphorous that has the oxidation stage of +III or +V,
and that alkaline earth metals as traces or minor impurity is present in less than 30 ppm of the multistage polymer composition and the multivalent cations is present in less than 50 ppm of the multistage polymer composition.

[024b] In another aspect, there is provided the use of the polymer composition obtained by the process as defined above as impact modifier for thermoplastic polymers.

[025] Surprisingly it has also been found that a thermoplastic composition comprising a multistage polymer obtained by a process for manufacturing a polymer composition comprising a multistage polymer comprising the steps of

f) addition of an aqueous solution or dispersion comprising a phosphorous containing compound wherein the phosphorous has the oxidation stage of +III or +V

g) drying the multistage polymer

h) mixing the multistage polymer with a thermoplastic polymer,

characterized in that the polymer composition comprises at least 350 ppm of phosphorous that has the oxidation stage of +III or +V,

and that alkaline earth metals as traces or minor impurity is present in less than 30 ppm of the multistage polymer composition and the multivalent cations is present in less than 50 ppm of the multistage polymer composition.

[025b] In another aspect, there is provided a thermoplastic polymer composition comprising the polymer composition obtained by the process as defined above.

[Detailed description of the invention]

[026] In a first aspect the present invention relates to a process for manufacturing a polymer composition comprising a multistage polymer comprising the steps of

a) polymerizing by emulsion polymerization of a monomer or monomer mixture (A_m) to obtain during this stage one layer (A) comprising polymer (A1) having a glass transition temperature of less then 0°C,

b) polymerizing by emulsion polymerization in presence of the polymer obtained in step a) of a monomer or monomer mixture (B_m) to obtain during this subsequent stage a layer (B) comprising a polymer (B1) having a glass transition temperature of at least 45°C,

c) coagulating the multistage polymer with an alkali metal salt,

d) washing the multistage polymer,

Claims

1. A process for manufacturing a polymer composition comprising a multistage polymer comprising the steps of

a) polymerizing by emulsion polymerization of a monomer or monomer mixture (A_m) to obtain during this stage one layer (A) comprising polymer (A1) having a glass transition temperature of less than 0°C,

b) polymerizing by emulsion polymerization in presence of the polymer obtained in step a) of a monomer or monomer mixture (B_m) to obtain during this subsequent stage a layer (B) comprising a polymer (B1) having a glass transition temperature of at least 45°C,

c) coagulating the multistage polymer with an alkali metal salt,

d) washing the multistage polymer,

e) adjusting the pH value after the coagulation to a value between 5 to 10,

f) addition of an aqueous solution or dispersion comprising a phosphorous containing compound wherein the phosphorous has the oxidation stage of +III or +V,

characterized in that the polymer composition comprises at least 350 ppm of phosphorous that has the oxidation stage of +III or +V,

and that alkaline earth metals as traces or minor impurity is present in less than 30 ppm of the multistage polymer composition and the multivalent cations is present in less than 50 ppm of the multistage polymer composition.

2. The process according to claim 1, characterized that the step a) and b) use in the emulsion polymerization a surfactant chosen from an anionic surface-active agent.

3. The process according to claim 1 or 2, characterized that alkali metal salt is a sodium or potassium salt.

4. The process according to any of claims 1 to 3, characterized that the process comprises an additional step g) drying the polymer composition.

5. The process according to any of claims 1 to 3, characterized that the polymer composition comprises at most 2000ppm, preferably at most 1900ppm and more preferably at most 1800ppm of phosphorous that has the oxidation stage of +III or +V.

6. The process according to any of claims 1 to 3, characterized that the polymer composition comprises between 350 ppm and 2000ppm, preferable between 370ppm and 1900ppm and more preferably between 390ppm and 1800ppm of phosphorous that has the oxidation stage of +III or +V.

7. The process according to any of claims 1 to 6, characterized that no multivalent cations are voluntary added .

8. The process according to any of claims 1 to 7, characterized that the initiator does not contain any voluntary added alkaline earth metals.

9. The process according to any of claims 1 to 6, characterized that no alkaline earth metals neither as ions nor in form of salts are voluntary added during the process.

10. The process according to any of claims 1 to 9, characterized that alkaline earth metals as traces or minor impurity present in less than 20ppm and more preferably less than 10ppm and preferably less than 9ppm of the polymer composition.

11. The process according to any of claims 1 to 9, characterized that alkaline earth metals as traces or minor impurity present less than 9ppm of the multistage polymer composition.

12. The process according to any of claims 1 to 11, characterized that multivalent cations present in less than 40ppm, more preferably less than 30ppm and preferably less than 20ppm of the multistage polymer composition.

13. The process according to any of claims 1 to 11, characterized that the multivalent cations present less than 20ppm of the multistage polymer composition.

14. The process according to any of claims 1 to 13, characterized that the adjusted pH after coagulation is between 6 and 9, more preferable between 6 and 7.5 and preferably between 6 and 7.

15. The process according to any of claims 1 to 14, characterized that the phosphorous containing compound is chosen from organophosphorous compound, a phosphate salt, phosphoric acid, phosphonate salts, phosphonic acid and their respective esters and mixtures thereof.

16. The process according to any of claims 1 to 15, characterized that in step f) the aqueous solution or dispersion comprising a phosphorous containing compound wherein the phosphorous has the oxidation stage of +III or +V is added by washing the multistage polymer which contains less than 60wt% of water with said aqueous solution or dispersion comprising a phosphorous containing compound wherein the phosphorous has the oxidation stage of +III or +V.

17. The process according to any of claims 1 to 15, characterized that in step f) the aqueous solution or dispersion comprising a phosphorous containing compound wherein the phosphorous has the oxidation stage of +III or +V is added on the wet cake after coagulation step and filtration step.

18. The process according to any of claims 1 to 15, characterized that in step f) the aqueous solution or dispersion comprising a phosphorous containing compound wherein the phosphorous has the oxidation stage of +III or +V is added during drying step of the multistage polymer, when the multistage polymer composition comprises still at least 10wt% of water.

19. Use of the polymer composition obtained by the process according to any of claims 1 to 18 as impact modifier for thermoplastic polymers.

20. Use of the polymer composition according to claim 19 characterized that the thermoplastic polymer is chosen from poly(vinyl chloride) (PVC), chlorinated poly(vinyl chloride) (C-PVC), polyesters, preferably poly (ethylene terephtalate) (PET) or poly(butylen terephtalate) (PBT) polyhydroxyalkanoates (PHA) or polylactic acid (PLA), cellulose acetate, polystyrene (PS), polycarbonates (PC), polyethylene, poly (methyl methacrylate)s (PMMA), (meth)acrylic copolymers, thermoplastic poly(methyl methacrylate-co-ethylacrylates), poly(alkylene-terephtalates), poly vinylidene fluoride , poly(vinylidenchloride), polyoxymethylen (POM) , semi-crystalline polyamides, amorphous polyamides, semi-crystalline copolyamides, amorphous copolyamides, polyetheramides, polyesteramides, copolymers of styrene and acrylonitrile (SAN), and their respective mixtures or alloys and preferably thermoplastic polymer composition comprises polycarbonate (PC) and/or polyester (PET or PBT) or PC or polyester alloys, wherein the alloys is preferably PC/ABS (poly(Acrylonitrile-co-butadiene-co-styrene), PC/ASA, PC/polyester or PC/PLA.

21. A process for manufacturing a polymer composition comprising a multistage polymer and a thermoplastic polymer comprising the steps of

a) polymerizing by emulsion polymerization of a monomer or monomer mixture (A_m) to obtain during this stage one layer (A) comprising polymer (A1) having a glass transition temperature of less than 0°C,

b) polymerizing by emulsion polymerization in presence of the polymer obtained in step a) of a monomer or monomer mixture (B_m) to obtain during this subsequent

stage a layer (B) comprising a polymer (B1) having a glass transition temperature of at least 45°C,

c) coagulating the multistage polymer with an alkali metal salt,

d) washing the multistage polymer,

e) adjusting the pH value after the coagulation to a value between 5 to 10,

f) addition of an aqueous solution or dispersion comprising a phosphorous containing compound wherein the phosphorous has the oxidation stage of +III or +V

g) drying the multistage polymer

h) mixing the multistage polymer with a thermoplastic polymer,

characterized in that the polymer composition comprises at least 350 ppm of phosphorous that has the oxidation stage of +III or +V,

and that alkaline earth metals as traces or minor impurity is present in less than 30 ppm of the multistage polymer composition and the multivalent cations is present in less than 50 ppm of the multistage polymer composition.

22. Thermoplastic polymer composition comprising the polymer composition obtained by the process according to any of claims 1 to 18 or 21.