[020] None of the prior art documents discloses a highly filled polymer composition comprising a halogen containing thermoplastic polymer and a (meth)acrylic copolymer with a filler where a part of the filler is added to the composition with the (meth)acrylic copolymer and a part of the filler is added to the composition with the halogen containing thermoplastic polymer.

[Brief description]

[021] Surprisingly it has been found that a composition comprising

a) a (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b)

b) a filler (F) or a mixture of two fillers (F1) and (F2)

c) a halogen containing thermoplastic polymer

characterized that the glass transition temperature Tg of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymers (A1a) and (A1b) is more important than 95°C and that the quantity of the filler (F) or the mixture of two fillers (F1) and (F2) is more than 40phr relative to the halogen containing thermoplastic polymer, gives a composition with an acceptable fusion time.

[021a] In an aspect, there is provided a composition comprising:

a) a (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate

b) a filler (F) or a mixture of two fillers (F1) and (F2) which is a mineral filler chosen from calcium carbonate, calcined clay, fumed silica, precipitated silica, clay, nano-clay, Montmorillonite, zeolite or perlite,

c) a halogen containing thermoplastic polymer

characterized that the glass transition temperature Tg of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymers (A1a) and (A1b) is more than 95°C and that the quantity of the filler (F) or the mixture of two fillers (F1) and (F2) is more than 40phr and less than 350 phr relative to the halogen containing thermoplastic polymer and that the molecular weight Mw of the (meth)acrylic copolymer (A1) or the two (meth)acrylic acid copolymers (A1a) and (A1b) comprising at least

50wt% of polymeric units coming from methyl methacrylate is at least 300 000g/mol and comprising between 0.01phr and 20phr of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymer (A1a) and (A1b) relative to the halogen containing thermoplastic polymer.

[022] Surprisingly it has also been found that a process for preparing a composition comprising

a) a (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b)

b) a filler (F) or a mixture of two fillers (F1) and (F2)

c) a halogen containing thermoplastic polymer

said process comprises the step of

blending a compositions P1 with a halogen containing polymer and a filler (F) or (F2) characterized that

the composition P1 comprises an (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b) and a filler (F) or (F1) and

wherein the glass transition temperature Tg of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymers (A1a) and (A1b) is more important than 95°C and that the quantity of the filler (F1) and (F2) together is more than 40phr in view of

the halogen containing thermoplastic polymer, gives a composition with a acceptable fusion time.

[022a] In an another aspect, there is provided a process for preparing a composition as defined above, said process comprises the step of

blending a compositions P1 with a halogen containing polymer and a filler (F) or (F2) characterized that the composition P1 comprises an (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate and a filler (F) or (F1), wherein the filler (F), (F1) and/or (F2) is a mineral filler chosen from calcium carbonate, calcined clay, fumed silica, precipitated silica, clay, nano-clay, Montmorillonite, zeolite or perlite and

wherein the glass transition temperature Tg of the (meth)acrylic copolymer is more than 95°C and that the quantity of the filler (F) or the mixture of two fillers (F1) and (F2) is more than 40phr and less than 350 phr relative to the halogen containing thermoplastic polymer and that the molecular weight Mw of the (meth)acrylic copolymer (A1) or the two (meth)acrylic acid copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate is at least 300 000g/mol and comprising between 0.01phr and 20phr of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymer (A1a) and (A1b) relative to the halogen containing thermoplastic polymer.

[023] Surprisingly it has also been found that a process for preparing a composition comprising

a) a (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b)
b) a filler (F) or a mixture of two fillers (F1) and (F2)
c) a halogen containing thermoplastic polymer

said process comprises the step of

blending two compositions P1 and P2 characterized that the composition P1 comprises an (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b) and a filler F1 and

the composition P2 a halogen containing polymer and a filler F2

wherein the glass transition temperature Tg of the (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b) is more important than 95°C and that the quantity of the filler (F1) and (F2) together is more than 40phr in view of the halogen containing thermoplastic polymer, gives a composition with a acceptable fusion time.

[023a] In another aspect, there is provided a process for preparing a composition as defined above, said process comprises the step of blending two compositions P1 and P2 characterized that
the composition P1 comprises an (meth)acrylic copolymer (A1) or mixture of two (meth)acrylic copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate and a filler (F) or (F1) and
the composition P2 a halogen containing polymer and a filler (F) or (F2), wherein the filler (F), (F1) and/or (F2) is a mineral filler chosen from calcium carbonate, calcined clay, fumed silica, precipitated silica, clay, nano-clay, Montmorillonite, zeolite or perlite,
characterized that the glass transition temperature Tg of the (meth)acrylic copolymer (A1) or mixture of two (meth)acrylic copolymers (A1a) and (A1b) is more than 95°C and that the quantity of the filler (F) or the mixture of two fillers (F1) and (F2) is more than 40phr and less than 350 phr relative to the halogen containing thermoplastic polymer and that the molecular weight Mw of the (meth)acrylic copolymer (A1) or the two (meth)acrylic acid copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate is at least 300 000g/mol and comprising between 0.01phr and 20phr of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymer (A1a) and (A1b) relative to the halogen containing thermoplastic polymer.

[024] Surprisingly it has also been found that a composition P1 comprising an (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b) and a filler (F) or (F1) can

be used to fuse in an acceptable time a composition comprising a halogen containing polymer and a filler (F) or (F2) wherein the glass transition temperature Tg of the (meth)acrylic copolymer is more important than 95°C and that the quantity of the filler (F1) and (F2) together is more than 40phr in view of the halogen containing thermoplastic polymer.

[025] Surprisingly it has also been found that a composition P1 comprising an (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b) and a filler (F) or (F1) can be used to fuse in an acceptable time a composition P2

comprising halogen containing polymer and a filler (F) or (F2) wherein the glass transition temperature Tg of the (meth)acrylic copolymer is more important than 95°C and that the quantity of the filler (F1) and (F2) together is more than 40phr in view of the halogen containing thermoplastic polymer.

[025a] In another aspect, there is provided the use of a composition P1 comprising an (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate and a filler (F) or (F1) to decrease the fusion time of a composition comprising a halogen containing polymer and a filler (F) or (F2), wherein the filler (F1), (F1) and/or (F2) is a mineral filler chosen from calcium carbonate, calcined clay, fumed silica, precipitated silica, clay, nano-clay, Montmorillonite, zeolite or perlite, characterized that the glass transition temperature Tg of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymers (A1a) and (A1b) is more than 95°C and that the quantity of the filler (F) or the mixture of two fillers (F1) and (F2) is more than 40phr relative to the halogen containing thermoplastic polymer and that the molecular weight Mw of the (meth)acrylic copolymer (A1) or the two (meth)acrylic acid copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate is at least 300 000g/mol and comprising between 0.01phr and 20phr of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymer (A1a) and (A1b) relative to the halogen containing thermoplastic polymer.

[025b] In another aspect, there is provided the use of a composition P1 comprising an (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate and a filler (F1) to decrease the fusion time of composition P2 comprising halogen containing polymer and a filler (F2), wherein the filler (F1) and/or (F2) is a mineral filler chosen from calcium carbonate, calcined clay, fumed silica, precipitated silica, clay, nano-clay, Montmorillonite, zeolite or perlite, characterized that

the glass transition temperature Tg of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymers (A1a) and (A1b) is more important than 95°C and that the quantity of the filler (F) or the mixture of two fillers (F1) and (F2) is more than 40phr and less than 350 phr relative to the halogen containing thermoplastic polymer and that the molecular weight Mw of the (meth)acrylic copolymer (A1) or the two (meth)acrylic acid copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate is at least 300 000g/mol and comprising between 0.01phr and 20phr of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymer (A1a) and (A1b) relative to the halogen containing thermoplastic polymer.

[025c] In another aspect, there is provided an article comprising a composition as defined above or a composition prepared by a process as defined above.

[Detailed description of the invention]

[026] According to a first aspect, the present invention relates to a composition comprising

a) a (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b)

b) a filler (F) or a mixture of two fillers (F1) and (F2)

c) a halogen containing thermoplastic polymer

characterized that the glass transition temperature Tg of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymers (A1a) and (A1b) is more important than 95°C and that the quantity of the filler (F) or the mixture of two fillers (F1) and (F2) is more than 40phr relative to the halogen containing thermoplastic polymer.

[027] In a second aspect the present invention relates to a preparing a composition comprising

a) a (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b)

b) a filler (F) or a mixture of two fillers (F1) and (F2)

c) a halogen containing thermoplastic polymer

said process comprises the step of

blending a compositions P1 with a halogen containing polymer and a filler (F) or (F2) characterized that

the composition P1 comprises an (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b) and a filler (F) or (F1) and

wherein the glass transition temperature Tg of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymers (A1a) and (A1b) is more important than 95°C and that the quantity of the filler (F) or the mixture of two fillers (F1) and (F2) is

Claims

1. A composition comprising:

   a) a (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b)comprising at least 50wt% of polymeric units coming from methyl methacrylate

   b) a filler (F) or a mixture of two fillers (F1) and (F2), which is a mineral filler chosen from calcium carbonate, calcined clay, fumed silica, precipitated silica, clay, nano-clay, Montmorillonite, zeolite or perlite,

   c) a halogen containing thermoplastic polymer

   characterized that the glass transition temperature Tg of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymers (A1a) and (A1b) is more than 95°C and that the quantity of the filler (F) or the mixture of two fillers (F1) and (F2) is more than 40phr and less than 350 phr relative to the halogen containing thermoplastic polymer and that the molecular weight Mw of the (meth)acrylic copolymer (A1) or the two (meth)acrylic acid copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate is at least 300 000g/mol and comprising between 0.01phr and 20phr of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymer (A1a) and (A1b) relative to the halogen containing thermoplastic polymer.

2. Composition according to claim 1, wherein a part of the filler (F) or a part of the mixture of two fillers (F1) and (F2) is added to the composition with the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymers (A1a) and (A1b) and the other part of the filler (F) or the other part of the mixture of two fillers (F1) and (F2) is added to the composition either apart or already with halogen containing thermoplastic polymer.

3. Composition according to claim 1 or 2, wherein the quantity of the filler (F) or mixture of two fillers (F1) and (F2) is between 40phr and 300phr relative to the halogen containing thermoplastic polymer.

4. Composition according to any of claims 1 to 3 comprising between between 50phr and 300phr of the filler (F) or mixture of two fillers (F1) and (F2) relative to the halogen containing thermoplastic polymer.

5. Composition according to any of claims 1 to 4 comprising between 0.05phr and 17phr of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymers (A1a) and (A1b) relative to the halogen containing thermoplastic polymer.

6. Composition according to any of claims 1 to 4, comprising between 0.15phr and 4phr of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymers (A1a) and (A1b) relative to the halogen containing thermoplastic polymer.

7. Composition according to any of claims 1 to 6 wherein the filler (F) or the mixture of two fillers (F1) and (F2) is chosen from calcium carbonate.

8. The composition according to claim 7, wherein the calcium carbonate is chosen from precipitated calcium carbonate (PCC), grinded natural calcium carbonate (GCC) or nanosized particles of precipitated calcium carbonate (NPCC).

9. Composition according to any of claims 1 to 6 wherein the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymers (A1a) and (A1b) is chosen from a copolymer comprising at least 80wt% of methyl methacrylate.

10. Composition according to any one of claims 1 to 9, wherein the molecular weight Mw of the (meth)acrylic copolymer (A1) or the two (meth)acrylic copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate is at least 500 000g/mol.

11. Composition according to claim 10 wherein the molecular weight Mw of the (meth)acrylic copolymer (A1) or the two (meth)acrylic copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate is less than 20 000 000g/mol.

12. Composition according to claim 10 wherein the molecular weight Mw of the (meth)acrylic copolymer (A1) or the two (meth)acrylic copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate is between 1 000 000 g/mol and 12 000 000g/mol.

13. Composition according to any of claims 1 to 12 wherein the glass transition temperature Tg of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymers (A1a) and (A1b) is between 95°C and 130°C and even more preferably between 100°C and 125°C.

14. Composition according to any of claims 1 to 12 wherein the glass transition temperature Tg of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymers (A1a) and (A1b) between 105°C and 120°C.

15. Composition according to any of claims 1 to 4 wherein the halogen containing thermoplastic polymer is chosen from a homo or copolymer of vinylchloride comprising at least 50wt% of vinylchloride units.

16. A process for preparing a composition according to claims 1 to 15, said process comprises the step of

blending a compositions P1 with a halogen containing polymer and a filler (F) or (F2) characterized that the composition P1 comprises an (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate and a filler (F) or (F1), wherein the filler (F), (F1) and/or (F2) is a mineral filler chosen from calcium carbonate, calcined clay, fumed silica, precipitated silica, clay, nano-clay, Montmorillonite, zeolite or perlite and

wherein the glass transition temperature Tg of the (meth)acrylic copolymer is more than 95°C and that the quantity of the filler (F) or the mixture of two fillers (F1) and (F2) is more than 40phr and less than 350 phr relative to the halogen containing thermoplastic polymer and that the molecular weight Mw of the (meth)acrylic copolymer (A1) or the two (meth)acrylic acid copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate is at least 300 000g/mol and comprising between 0.01phr and 20phr of the (meth)acrylic copolymer (A1)

or the mixture of two (meth)acrylic copolymer (A1a) and (A1b) relative to the halogen containing thermoplastic polymer.

17. A process for preparing a composition according to claims 1 to 15, said process comprises the step of

blending two compositions P1 and P2 characterized that

the composition P1 comprises an (meth)acrylic copolymer (A1) or mixture of two (meth)acrylic copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate and a filler (F) or (F1) and

the composition P2 a halogen containing polymer and a filler (F) or (F2), wherein the filler (F), (F1) and/or (F2) is a mineral filler chosen from calcium carbonate, calcined clay, fumed silica, precipitated silica, clay, nano-clay, Montmorillonite, zeolite or perlite,

characterized that the glass transition temperature Tg of the (meth)acrylic copolymer (A1) or mixture of two (meth)acrylic copolymers (A1a) and (A1b) is more than 95°C and that the quantity of the filler (F) or the mixture of two fillers (F1) and (F2) is more than 40phr and less than 350 phr relative to the halogen containing thermoplastic polymer and that the molecular weight Mw of the (meth)acrylic copolymer (A1) or the two (meth)acrylic acid copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate is at least 300 000g/mol and comprising between 0.01phr and 20phr of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymer (A1a) and (A1b) relative to the halogen containing thermoplastic polymer.

18. The process according to claim 16 or 17, characterized that the composition P1 is obtained by a manufacturing method comprising the step of

a) mixing of at least one (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b) with at least one filler (F) or (F1)

wherein the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymers (A1a) and (A1b) and the filler F) or (F1) in step a) are in form of a dispersion in aqueous phase.

19. The process according to claim 16 or 17, characterized that the composition P1 is obtained by a manufacturing method comprising the step of

a) mixing of at least one (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b) with at least one filler (F) or (F1)

b) recovering of the mixture obtained in a)

c) drying the recovered mixture of step b)

wherein the (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b) and the mineral filler in step a) are in form of a dispersion in aqueous phase.

20. The process according to any of claims 16 to 19, characterized that the composition P1 comprises between 1wt% and 50wt%, preferably between 2wt% and 50wt% and more preferably between 5wt% and 50wt% of the filler (F) or (F1) relatively to the composition P1 made of meth)acrylic copolymer (A1) or

the mixture of two (meth)acrylic copolymers (A1a) and (A1b) and the filler.

21. The process according to any of claims 16 to 10, characterized that the composition P1 is in form of a powder.

22. The process according to any of claims 16 to 21, characterized that the composition P1 is in form of a powder having volume median particle size D50 between 1µm and 500µm.

23. The process according to any of claims 16 to 22, characterized that the composition P1 is a homogenous powder comprising one (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b) with at least one filler (F) or (F1).

24. The process according to any of claims 21 to 23, characterized that each powder particle or grain of the composition P1 comprises the two components the meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymers (A1a) and (A1b) and filler.

25. The process according to any of claims 16 to 24, characterized that the the molecular weight Mw of the (meth)acrylic copolymer (A1) or the two (meth)acrylic copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate is between 1 000 000 g/mol and 12 000 000g/mol.

26. The process according to any of claims 16 to 24, characterized that thethe glass transition temperature Tg of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymers (A1a) and (A1b) is between 95°C and 130°C and even more preferably between 100°C and 125°C.

27. The process according to claim 17, characterized that the composition P2 comprises between 40phr and 350phr of the filler (F2).

28. Use of a composition P1 comprising an (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate and a filler (F) or (F1) to decrease the fusion time of a composition comprising a halogen containing polymer and a filler (F) or (F2), wherein the filler (F), (F1) and/or (F2) is a mineral filler chosen from calcium carbonate, calcined clay, fumed silica, precipitated silica, clay, nano-clay, Montmorillonite, zeolite or perlite, characterized that the glass transition temperature Tg of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymers (A1a) and (A1b) is more than 95°C and that the quantity of the filler (F) or the mixture of two fillers (F1) and (F2) is more than 40phr and less than 350 phr relative to the halogen containing thermoplastic polymer and that the molecular weight Mw of the (meth)acrylic copolymer (A1) or the two (meth)acrylic acid copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate is at least 300 000g/mol and comprising between 0.01phr and 20phr of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymer (A1a) and (A1b) relative to the halogen containing thermoplastic polymer.

29. Use of a composition P1 comprising an (meth)acrylic copolymer (A1) or a mixture of two (meth)acrylic copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate and a filler (F1) to decrease the fusion time of composition P2 comprising halogen containing polymer and a filler (F2), wherein the filler (F1) and/or (F2) is a mineral filler chosen from calcium carbonate, calcined clay, fumed silica, precipitated silica, clay, nano-clay, Montmorillonite, zeolite or perlite, characterized that the glass transition temperature Tg of the (meth)acrylic copolymer

(A1) or the mixture of two (meth)acrylic copolymers (A1a) and (A1b) is more than 95°C and that the quantity of the mixture of two fillers (F1) and (F2) is more than 40phr and less than 350 phr relative to the halogen containing thermoplastic polymer and that the molecular weight Mw of the (meth)acrylic copolymer (A1) or the two (meth)acrylic acid copolymers (A1a) and (A1b) comprising at least 50wt% of polymeric units coming from methyl methacrylate is at least 300 000g/mol and comprising between 0.01phr and 20phr of the (meth)acrylic copolymer (A1) or the mixture of two (meth)acrylic copolymer (A1a) and (A1b) relative to the halogen containing thermoplastic polymer.

30. Article comprising a composition according to any of claims 1 to 15 or a composition prepared by a process according to any of claims 16 to 27.

31. Article according to claim 30, characterized that the article is a profile, a pipe, a siding, a flooring film or sheet.