Claims

1. Aqueous polyorganosiloxane hybrid resin dispersion comprising:
at least one polyorganosiloxane hybrid resin which comprises a reaction product of a composition comprising

- component A) 5 to 95 parts by weight of one or more polyorganosiloxanes of the general formula

  - $R_aSi(OR')_bO_{(4-a-b/2)}$ formula (I)

  - with $0<a<2$, $0<b<2$ and $a+b<4$,

- component B) 1-20 parts by weight of one or more linear and/or branched polyorganosiloxanes of the formula

  - $R''O-[R'''_2Si-O]_n-R''$ formula (II)

  where R" and R"' are each independently an alkyl radical having 1 to 8 carbon atoms or an aromatic radical having 6 to 20 carbon atoms and n is a number in the range from 4 to 250, and

- component C) 5 to 95 parts by weight of an organic polymer containing hydroxyl groups selected from the group consisting of polyepoxides, polyesters, polyacrylates and/or methacrylates and copolymers thereof, polyurethanes, cellulose derivatives, polysulfones, polyether sulfones, polyphenylene sulfides and oxides, polyamides, polyamide imide, polyimides, polyethers, aromatic and aliphatic glycidyl-functional polymers, and oligomers thereof, phenoxy resins, polycarbonates, ketone-formaldehyde resins, polyvinyl resins, phenolic resins, fluoropolymers, alkyd resins, and mixtures thereof,

wherein R and R' are each independently an alkyl radical having 1 to 8 carbon atoms or an aromatic radical having 6 to 20 carbon atoms, and

at least one emulsifier comprising a partly hydrolysed polyvinylacetate,

wherein the aqueous polyorganosiloxane hybrid resin dispersion has a solids content of 30.0% - 70.0% by weight, based on the aqueous polyorganosiloxane hybrid resin dispersion, and a residual solvent content of < 6.0% by weight, based on the aqueous polyorganosiloxane hybrid resin dispersion,

said reaction product is a reaction of said polyorganosiloxane A) with hydroxyl groups of said organic polymer C) containing hydroxyl groups, and

a weight ratio of said polyorganosiloxane hybrid resin to emulsifier is between 5 - 50 :1.

2. The aqueous polyorganosiloxane hybrid resin dispersion according to Claim 1, wherein the organic polymer contains acidic hydrogen.

3. The aqueous polyorganosiloxane hybrid resin dispersion according to Claim 1, wherein the partly hydrolysed polyvinylacetate has an alcoholysis level between 10%-99% (mol/mol).

4. The aqueous polyorganosiloxane hybrid resin dispersion according to Claim 1, wherein the partly hydrolysed polyvinylacetates have a viscosity, measured in a 4% aqueous polyvinylacetate solution at 20°C to DIN 53015, of 1-50 mPa s.

5. The aqueous polyorganosiloxane hybrid resin dispersion according to Claim 1, wherein the aqueous polyorganosiloxane hybrid resin dispersion further comprises an additional emulsifier selected from the group consisting of the anionic, cationic, zwitterionic, nonionic emulsifiers, and mixtures thereof.

6. The aqueous polyorganosiloxane hybrid resin dispersion according to Claim 1, wherein the flashpoint of the aqueous polyorganosiloxane hybrid resin dispersion is > 30.0°C.

7. The aqueous polyorganosiloxane hybrid resin dispersion according to Claim 1, wherein the aqueous polyorganosiloxane hybrid resin dispersion further comprises an additive selected from the group consisting of defoamers, deaerating agents, rheology additives, preservatives, substrate wetting agents, crosslinkers, drying aids, catalysts, antioxidants, anti-skinning agents, anti-settling agents, thickeners, coalescing agents, film-forming aids, fillers, pigments, dispersants, and mixtures thereof.

8. The aqueous polyorganosiloxane hybrid resin dispersion according to Claim 7, wherein the additive is a preservative selected from the group consisting of fungicides, bactericides, pesticides, algicides, herbicides, and mixtures thereof.

9. The aqueous polyorganosiloxane hybrid resin dispersion according to Claim 1, wherein said polyorganosiloxane hybrid resin is presented as particles in said dispersion having an average volume-weighted diameter measured according to ISO 13320:2009, of between 0.1-10.0 µm.

10. The aqueous polyorganosiloxane hybrid resin dispersion according to claim 1, wherein said organic polymer is at least one polyvinyl resin selected from the group consisting of polyvinyl alcohol, polyglycerols, polyvinylacetate, and (partial) hydrolysates and derivatives thereof.

11. The aqueous polyorganosiloxane hybrid resin dispersion according to claim 1, wherein component C) is an organic polymer selected from the group consisting of polyepoxides, polyesters, polyacrylates and/or methacrylates and copolymers thereof, polyurethanes, cellulose derivatives, polysulfones, polyether sulfones, polyphenylene sulfides and oxides, polyamides, polyamide imide, polyimides, polyethers, aromatic and aliphatic glycidyl-functional polymers, and oligomers thereof, phenoxy resins, polycarbonates, ketone-formaldehyde resins, phenolic resins, fluoropolymers, alkyd resins, and mixtures thereof.

12. A coating material, a coating, paint, substrate coating, semifinished product, adhesive, ink, sealant, compounding matrix, or size, comprising:
the polyorganosiloxane hybrid resin dispersion according to Claim 1.

13. A substrate coated with a composition comprising the aqueous polyorganosiloxane hybrid resin dispersion according to Claim 1.

14. Process of producing aqueous polyorganosiloxane hybrid resin dispersion according to any claims 1 – 11, comprising the steps of
    a. emulsifying a polyorganosiloxane hybrid resin solution comprising an organic or semi-organic solvent with an emulsifier solution comprising at least one emulsifier based on partly hydrolysed polyvinylacetates and

b. removing the solvent.

15. Process according to claim 14, wherein an aqueous emulsifier solution or an aqueous emulsifier system solution having a concentration between 5-40% by weight, preferably 10-30% by weight, more preferably 15-25% by weight, based on the emulsifier solution, is used.

16. Process according to any claims 14 -15, wherein water is additionally added in step a).

17. Process according to any claims 14 - 16, wherein the solids content for the aqueous polyorganosiloxane hybrid resin dispersion is adjusted after step b).

18. Process according to any claims 14-17, wherein the polyorganosiloxane hybrid resin comprises reaction products of a composition comprising

- component A) 5 to 95 parts by weight, preferably 10 to 70 parts by weight, of one or more polyorganosiloxanes of the general formula

$$R_aSi(OR')_bO_{(4-a-b/2)} \qquad \text{Formula (I)}$$

with $0<a<2$, $0<b<2$ and $a+b<4$,

- optionally component B) 0-20 parts by weight, preferably 1-10 parts by weight, of one or more linear and/or branched polyorganosiloxanes of the formula

$$R''O-[R'''_2Si-O]_n- \qquad \text{Formula (II)}$$

- component C) 5 to 95 parts by weight, preferably 30 to 90 parts by weight, of an organic polymer,

where

R_a, R', R'' and R''' are each independently an alkyl radical having 1 to 8 carbon atoms or an aromatic radical having 6 to 20 carbon atoms and n is a number in the range from 4 to 250.

19. Process according to any claims 14 - 18, wherein the organic polymer comprises organic polymers containing hydroxyl groups, preferably selected from the group of the

polyepoxides, polyesters, polyacrylates and/or methacrylates and copolymers thereof, polyurethanes, cellulose derivatives, polysulfones, polyether sulfones, polyphenylene sulfides and oxides, polyamides, polyamide imide, polyimides, polyethers, aromatic and aliphatic glycidyl-functional polymers, oligomers, phenoxy resins, polycarbonates, ketone-formaldehyde resins, polyvinyl resins selected from polyvinyl alcohol, polyglycerols, polyvinylacetate, (partial) hydrolysates and derivatives thereof, phenolic resins, fluoropolymers, alkyd resins and mixtures thereof.

20. Process according to any claims 14 - 19, wherein the emulsifiers are partly hydrolysed polyvinylacetates having an alcoholysis level between 10%-99% (mol/mol), preferably between 50% and 95% (mol/mol), and more preferably between 70% and 90% (mol/mol).

21 Process according to any claims 14 - 20, wherein the partly hydrolysed polyvinylacetates have a viscosity, measured in a 4% aqueous polyvinylacetate solution at 20°C to DIN 53015, of 1-50 mPa s, preferably 1-40 mPa s and more preferably 1-30 mPa s.

22 Process according to any claims 14 - 21, wherein further emulsifiers selected from the group of the anionic, cationic, zwitterionic or nonionic emulsifiers are used.

23. Process according to any claims 14 - 22, wherein the solvent is at least one organic solvent that has been used in the preparation of the polyorganosiloxane hybrid resin or is at least one semi-organic solvent.

24. Process according to any claims 14 - 23, wherein the organic solvent or mixtures thereof has a boiling point range of 50°C-150°C, preferably 90°C-120°C.

25. Process according to any claims 14 - 24, wherein the solvent is removed by means of distillation under reduced pressure with or without stripping gas, steam distillation, or by means of a membrane process, a thin-film evaporator or a countercurrent process.

26. Process according to any claims 14 - 25, wherein the polyorganosiloxane hybrid resin solution has a polyorganosiloxane hybrid resin concentration of 40.0% by weight-

95.0% by weight, preferably 60.0% by weight-70.0% by weight, based on the polyorganosiloxane hybrid resin solution.

27. Process according to any claims 14 - 26, wherein the flashpoint of the aqueous polyorganosiloxane hybrid resin dispersion produced by the process can be increased.