Claims

1. Aqueous polyorganosiloxane hybrid resin dispersion comprising
   - at least one polyorganosiloxane hybrid resin, where 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

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

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

     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,

     ~~• 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~~

     ~~o R''O [R'''$_2$Si O]$_n$ formula (II)~~ and

     • component C) 5 to 95 parts by weight, preferably 30 to 90 parts by weight, of an organic polymer, wherein the organic polymer is 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.

     ~~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,~~

   - at least one emulsifier based on partly hydrolysed polyvinylacetates,

- wherein said dispersion has a solids content of 30.0% by weight-70.0% by weight, preferably 45.0% by weight-55.0% by weight, based on the polyorganosiloxane hybrid resin dispersion, and the residual solvent content is < 6.0% by weight, preferably < 2.5% by weight, more preferably < 1.0% by weight, based on the polyorganosiloxane hybrid resin dispersion.

~~2. Polyorganosiloxane hybrid resin dispersion according to Claim 1, characterized in that the organic polymer is 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.~~

~~3~~2. Polyorganosiloxane hybrid resin dispersion according to Claim 1~~ or 2~~, ~~characterized in that~~wherein the organic polymer contains hydroxyl groups and/or acidic hydrogen.

~~3~~4. Polyorganosiloxane hybrid resin dispersion according to any of Claims 1-~~2~~3, ~~characterized in that~~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).

~~4~~5. Polyorganosiloxane hybrid resin dispersion according to any of Claims 1-~~3~~4, ~~characterized in that~~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.

~~5~~6. Polyorganosiloxane hybrid resin dispersion according to any of the preceding claims, ~~characterized in that it includes~~further comprising further emulsifiers selected from the group of the anionic, cationic, zwitterionic or nonionic emulsifiers.

~~7~~6. Polyorganosiloxane hybrid resin dispersion according to any of the preceding claims, ~~characterized in that~~wherein the flashpoint of the dispersion by the method in the description is > 30.0°C, preferably > 60.0°C and more preferably > 90.0°C.

~~8~~7. Polyorganosiloxane hybrid resin dispersion according to any of the preceding claims, ~~characterized in that~~wherein the weight ratio of polyorganosiloxane hybrid resin to emulsifier or emulsifier system is between 5-50, preferably between 7-40, more preferably between 10-30.

~~9~~8. Polyorganosiloxane hybrid resin dispersion according to any of the preceding claims, ~~characterized in that it includes~~further comprising further additives selected from 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 and/or dispersants.

~~10~~9.Polyorganosiloxane hybrid resin dispersion according to any of the preceding claims, ~~characterized in that~~wherein the preservatives used are fungicides, bactericides, pesticides, algicides and/or herbicides.

~~11~~10. Polyorganosiloxane hybrid resin dispersion according to any of the preceding claims, ~~characterized in that~~wherein the average volume-weighted diameter of the polyorganosiloxane hybrid resin particles, measured to ISO 13320:2009, is between 0.1-10.0 µm, preferably between 0.1-2.0 µm, more preferably between 0.2-1.0 µm and most preferably between 0.2-0.7 µm.

~~12~~11. Process for producing aqueous polyorganosiloxane hybrid resin dispersion according to any the preceding claims, 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.

~~13~~12. Process according to ~~any of the preceding claims~~claim 11, ~~characterized in that~~wherein an aqueous emulsifier solution or an aqueous emulsifier system solution

~~wherein the~~having a concentration ~~is~~ between 5-40% by weight, preferably 10-30% by weight, more preferably 15-25% by weight, based on the emulsifier solution, is used.

~~14~~13. Process according to any ~~of the preceding~~ claims 11-12, ~~characterized in that~~wherein water is additionally added in step a).

~~15~~14. Process according to any ~~of the preceding~~ claims 11-13, ~~characterized in that~~wherein the solids content for the aqueous polyorganosiloxane hybrid resin dispersion is adjusted after step b).

~~16~~15. Process according to any ~~of the preceding~~ claims 11-14, ~~characterized in that~~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

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

- 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.

~~17~~16. Process according to any ~~of the preceding~~ claims 11-15, ~~characterized in that~~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.

~~18~~17. Process according to any ~~of the preceding~~ claims 11-16, ~~characterized in that~~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).

~~19~~18. Process according to any ~~of the preceding~~ claims 11-17, ~~characterized in that~~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.

~~20~~19. Process according to any ~~of the preceding~~ claims 11-18, ~~characterized in that~~wherein further emulsifiers selected from the group of the anionic, cationic, zwitterionic or nonionic emulsifiers are used.

~~21~~20. Process according to any ~~of the preceding~~ claims 11 -19, ~~characterized in that~~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.

~~22~~21. Process according to any ~~of the preceding~~ claims 11-20, ~~characterized in that~~wherein the organic solvent or mixtures thereof has a boiling point range of 50°C-150°C, preferably 90°C-120°C.

~~23~~22. Process according to any ~~of the preceding~~ claims 11-21, ~~characterized in that~~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.

2423. Process according to any ~~of the preceding~~ claims 11-22, ~~characterized in that~~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.

2524. Process according to any ~~of the preceding~~ claims 11-23, ~~characterized in that~~wherein the flashpoint of the aqueous polyorganosiloxane hybrid resin dispersion produced by the process can be increased.

2625. Use of the polyorganosiloxane hybrid resin dispersion according to any of Claims 1-1~~1~~0 in coating materials, and also coatings and paints, substrate coatings, semifinished products, adhesives, inks, sealants, compounding matrices and sizes.

2726. Substrates, especially baking trays, baking tins, pans, metal pots and the like, coated with a composition comprising a dispersion according to any of Claims 1 to 1~~1~~0.