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(54) Title: WATERBORNE HOMO OR COPOLYMER DISPERSION

(57) Abstract: The present invention refers to a waterborne homo or copolymer dispersion comprising at least one alkenyl functional dendritic polymer being mixed into at least one homo or copolymer obtained by polymerisation, such as emulsion polymerisation, in an aqueous medium of at least one polymerisable allyl, vinyl, maleic or diene monomer. Said dendritic polymer is built up from a dendritic core polymer and at least one alkenyl functional compound bonded to said core polymer. In a further aspect the present invention refers to a process for production of said homo or copolymer dispersion and to the use thereof.

WATERBORNE HOMO OR COPOLYMER DISPERSION

The present invention refers to a waterborne homo or copolymer dispersion comprising at least one alkenyl functional dendritic polymer being physically admixed into a homo or copolymer obtained by homo or copolymerisation, such as emulsion homo or copolymerisation, in an aqueous medium. In further aspects the present invention refers to a process for production of said waterborne homo or copolymer dispersion and to the use of said homo or copolymer dispersion.

Emulsion polymerisation is the most important industrial method for manufacture of aqueous dispersion polymers. Emulsion polymerisation is typically performed in an aqueous medium in the presence of a surfactant and a water-soluble initiator and is usually rapidly giving high molecular weight homo or copolymers at high solids content and low dispersion viscosity. The final product is normally an opaque, grey or milky-white dispersion of high molecular weight polymer(s) at a solids content of typically 30-60% in water. Said dispersion typically comprises acrylic, methacrylic and crotonic acid homo and copolymers, methacrylate and acrylate ester homo or copolymers, vinyl acetate homo or copolymers, vinyl and vinylidene chloride homo or copolymers, ethylene homo or copolymers, styrene and butadiene homo or copolymers, acrylamide homo or copolymers, butadiene-acrylonitrile copolymers, styrene-acrolein copolymers and/or where applicable carboxylated versions. Traditional applications for such aqueous dispersions are adhesives, binders for fibres and particulate matter, protective and decorative coatings, dipped goods, foam, paper coatings, backings for carpet and upholstery, modifiers for bitumens and concrete and thread and textile modifiers. More recent applications include biomedical applications as protein immobilisers, visual detectors in immunoassays, as release agents, in electronic applications as photoresists for circuit boards, in batteries, conductive paint, copy machines and as key components in molecular electronic devices.

Numerous recipes have been published, primarily in the patent literature, that describe the preparation and property improvements of homopolymer and copolymer dispersions. For instance WO 02/32982 discloses aqueous coating compositions exhibiting prolonged open time obtained by addition of crosslinkable water dispersible hyperbranched macromolecules. The hyperbranched macromolecules are either completely water soluble or have partial solubility in water. The water solubility is obtained by introducing into the hyperbranched macromolecule hydrophilic water dispersing groups, such as long chain polyethylene oxide groups and acid groups neutralised, with for instance ammonia or a hydroxide, to form a salt. Despite many property improvements related to various dispersions and paints etc. made

therefrom, there are still need for further improvements, such as improved blocking.

The present invention accordingly refers to a novel waterborne homo or copolymer dispersion exhibiting, among other properties, substantially improved blocking properties. Said homo or copolymer dispersion comprises 0.1-25%, such as 1-10% or 2-6%, by weight of at least one alkenyl functional dendritic polymer being built up from a dendritic core polymer and at least one alkenyl functional compound. It has, in view of what is disclosed in WO 02/32982, quite surprisingly through the present invention been possible to produce a waterborne polymer dispersion comprising a dendritic polymer lacking neutralised acid groups and/or other groups known per se to render water dispersibility. The alkenyl functional dendritic polymer is physically admixed into at least one homo or copolymer obtained by polymerisation in an aqueous medium of at least one polymerisable allyl, vinyl, maleic or diene monomer. The core polymer of said alkenyl functional dendritic polymer is optionally chain extended and said at least one alkenyl functional compound is added to said core polymer and/or said optional chain extension.

The homo or copolymer is in preferred embodiments obtained in a one stage emulsion homo or copolymerisation or is a polymer obtained in a multi stage emulsion homo or copolymerisation. Said emulsion homo or copolymerisation may for instance yield latex particles having a heterogeneous morphology, such as a core-shell morphology. When monomers of different solubility or hydrophobicity are used or when staged polymerisations are carried out, core-shell morphologies are possible. In staged polymerisations, spherical core-shell particles are made when a polymer made from a first monomer is more hydrophobic than a polymer made from a second monomer.

The alkenyl functional dendritic polymer is prior to admixing preferably dissolved or dispersed in at least one coalescent agent, such as a glycol or a glycol ester or ether for instance selected from the group consisting of propylene glycol, hexylene glycol, butyl glycol, butyl diglycol, 1-methoxy-2-propanol, 2,2,4-trimethyl-1,3-pentadiol monoisobutyrate, 2,2,4-trimethyl-1,3-pentanediol diisobutyrate, dipropylene glycol methyl ether, dipropylene glycol propyl ether, dipropylene glycol *n*-butyl ether, propylene glycol phenyl ether, tripropylene glycol monoisobutyrate, tripropylene glycol *n*-butyl ether, butyl glycol acetate and butyl diglycol acetate. Further suitable coalescent agents include for instance white spirit, pine oil, 2-ethylhexyl benzoate, dibutyl phthalate, dioctyl phthalate, N-methyl pyrrolidone, tributoxyethyl phosphate and diisobutyl esters of long chain dicarboxylic acids.

Said dendritic core polymer is advantageously and preferably a hydroxyfunctional dendritic polyester, polyether, polyesteramide or polyetheramide built up from alcohols, epoxies, oxetanes, aminoalcohols, hydroxyfunctional carboxylic acids, carboxylic acids or anhydrides, glycidyl esters and/or glycidyl ethers as disclosed in for instance WO 93/17060, WO 93/18075, WO 96/07688, WO 96/12754, WO 00/56802 and WO 01/16213. It is of course understood that alcohols, epoxies, oxetanes, aminoalcohols, hydroxyfunctional carboxylic acids, carboxylic acids or anhydrides, glycidyl esters and/or glycidyl ethers include mono, di, tri and polyfunctional compounds possessing necessary amount of reactive groups, sites and/or functions to yield and/or participate in formation of dendritic structures, including dendrimers. It is also understood that the hydroxyfunctionality of said dendritic core polymer may be derived from one or more hydroxyl, hydroxyalkyl, hydroxyalkoxy, hydroxyalkoxyalkyl, hydroxyalkylamide groups and the like.

The alkenyl functionality of said alkenyl functional dendritic polymer is in preferred embodiments obtained by addition, to said core polymer and/or its optional chain extension, of at least one aliphatic unsaturated carboxylic acid or a corresponding anhydride or halide, at least one unsaturated carboxyfunctional ester, polyester, ether or polyether and/or obtained by reaction with at least one alkenyl halide. The alkenyl functionality can for instance be obtained by addition of acrylic acid, methacrylic acid, crotonic acid, isocrotonic acid or a to a said acid corresponding anhydride or halide. Further suitable alkenyl functional compounds, added to said core polymer and/or its optional chain extension, include unsaturated monoacids, such as benzoic acid, *p*-tertbutylbenzoic acid, soybean fatty acid, linseed fatty acid, tall oil fatty acid, castor fatty acid, dehydrated castor fatty acid, sunflower fatty acid, oleic acid, linoleic acid and linolenic acid and diacids, such as maleic acid, or its anhydride, and fumaric acid. Alkenyl functionality can also be obtained by reaction with for instance at least one alkenyl halide, such as allyl chloride and/or allyl bromide.

Said alkenyl functionality can, furthermore, be obtained by addition of an unsaturated carboxyfunctional ester of at least one saturated or unsaturated di, tri or polyfunctional carboxylic acid and at least one hydroxyfunctional (having at least one hydroxyl group) allyl ether of at least one di, tri or polyhydric alcohol or at least one di, tri or polyhydric reaction product between at least one alkylene oxide and at least one di, tri or polyhydric alcohol or at least one hydroxyfunctional allyl ether of a di, tri or polyhydric alcohol. Said di, tri or polycarboxylic acid is, in these embodiments, suitably and preferably selected from the group consisting of maleic acid, fumaric acid, tetrahydrophthalic acid, hexahydrophthalic acid, azelaic acid, adipic acid, trimelletic acid and a to a said acid corresponding anhydride. Said di,

tri or polyhydric alcohol is likewise preferably a 1,ω-diol, 5,5-di(hydroxyalkyl)-1,3-dioxane, 2-alkyl-1,3-propanediol, 2,2-dialkyl-1,3-propanediol, 2-hydroxy-1,3-propanediol, 2-hydroxy--2-alkyl-1,3-propanediol, 2-hydroxyalkyl-2-alkyl-1,3-propanediol, 2,2-di(hydroxyalkyl)--1,3-propanediol or a dimer, trimer or polymer of a said di, tri or polyhydric alcohol. Further embodiments include hydroxyfunctional allyl ethers and alkoxylates of a said polyhydric compound. Alkyl is in above disclosure preferably C_1-C_{24} alkyl or C_2-C_{24} alkenyl, such as C_1-C_{12} or C_2-C_8 alkyl or alkenyl. Suitable di, tri or polyhydric alcohols can be exemplified by and include compounds such as 1,4-butanediol, 1,5-pentanediol, 1,6-hexanediol, 1,6-cyclohexane dimethanol, 5,5-dihydroxymethyl-1,3-dioxane, 2-methyl-1,3-propanediol, 2-methyl-2-ethyl-1,3-propanediol, 2-ethyl-2-butyl-1,3-propanediol, neopentyl glycol, dimethylolpropane, 1,1-dimethylolcyclohexane, glycerol, trimethylolethane, trimethylolpropane, diglycerol, ditrimethylolethane, ditrimethylolpropane, pentaerythritol, dipentaerythritol, anhydroennea-heptitol, sorbitol, mannitol, hydroxyfunctional allyl ethers and alkoxylates of a said polyhydric compound.

Alkoxylates as disclosed above are to be understood as reaction products between at least one alkylene oxide, such as ethylene oxide, propylene oxide, 1,3-butylene oxide, 2,4-butylene oxide, cyclohexene oxide, butadiene monoxide and/or phenylethylene oxide, and at least one said di, tri or polyalcohol.

Said polymerisable, where applicable homo and/or copolymerisable, monomer is in preferred embodiments suitably selected from the group consisting of acrylic acid, methacrylic acid, crotonic acid, isocrotonic acid, itaconic acid, maleic anhydride, fumaric acid, glycidyl acrylates, glycidyl methacrylates, acrylamide, methacrylamide, ethyl imidazolidon methacrylate, ethylene, propylene, styrene, divinylstyrene, vinylacetate, vinyl propionate, vinyl versatate, dibutyl maleate, butadiene, isoprene and C_1-C_{10} alkyl acrylates and methacrylates, such as methyl acrylate, ethyl acrylate, butyl acrylate, 2-ethylhexyl acrylate, methyl methacrylate, ethyl methacrylate or butyl methacrylate.

Further embodiments of the dispersion according to the present invention include species comprising at least one polymerisable surfactant, such as a surfactant comprising at least one alkenyl group, and/or a conventional surfactant in combination with said at least one alkenyl functional dendritic polymer.

In a further aspect, the present invention refers to a process for production of a waterborne homo or copolymer as disclosed above. Said process comprises the steps of (a) dissolving at

least one alkenyl functional dendritic polymer in at least one coalescent agent and (b) subsequently physically admixing obtained solution into at least one homo or copolymer obtainable by polymerisation in an aqueous medium of at least one polymerisable allyl, vinyl, maleic or diene monomer. Preferred embodiments of the alkenyl functional dendritic polymer, the dendritic core polymer, the polymerisable allyl, vinyl, maleic or diene monomer, the coalesent agent and other included raw materials are as disclosed above.

In yet a further aspect, the present invention refers to the use of said novel waterborne copolymer dispersion, as disclosed above or produced by said process, in binders for coatings, such as decorative and/or protective paints and lacquers, adhesives and glues.

Without further elaboration, it is believed that one skilled in the art can, using the preceding description, utilise the present invention to its fullest extent. The following preferred specific embodiments are, therefore, to be construed as merely illustrative and not limitative of the remainder of the disclosure in any way whatsoever. In the following Example 1 illustrate preparation of a dendritic acrylate of the polyester type and Examples 2-4 refer to dispersions, and paints made therefrom, comprising the dendritic product of Example 1.

Example 1

350.0 g of a commercial dendritic polyester (Boltorn® H20, Perstorp Specialty Chemicals AB, Sweden), having a nominal molecular weight of 1750 g/mole and a hydroxyl value of 511 mg KOH/g, and 816.3 g of sun flower fatty acid were charged to a 2 litres glass reactor equipped with a stirrer, a Dean-Stark water trap, a cooler and nitrogen purge. The reaction mixture was during 20 minutes heated from 23°C to 103°C and 11.7 g of benzoic acid was now added. The temperature had after a further 10 minutes reached 140°C and 1.09 g of $Ca(OH)_2$, 1.2 g of an organic tin catalyst and 75 ml of xylene were now charged to the reactor. The temperature of the reaction mixture was during 50 minutes further increased from 140°C to 200°C, at which temperature reaction water started to form. The reaction was allowed to continue for 9 hours until an acid value of 8.3 mg KOH/g was reached. The reaction product was cooled and a filtering aid was added and the mixture was passed through a pressure filter. Obtained clear solution was re-charged to the reactor and was heated to 120°C. Full vacuum was now applied to remove residual xylene.

The final product was a low viscous clear, yellow liquid with the following properties:

Molecular weight, g/mole:	6 542
Molecular weight (nominal), g/mole:	5 600
Number of unsaturated fatty acid groups, eq:	14.4
Final acid value, mg KOH/g:	5.1
Final hydroxyl value, mg KOH/g:	15
Viscosity at 23°C (Brookfield), mPas:	1 200
Non-volatile content, % by weight:	100

Example 2

The dendritic product obtained in Example 1 was admixed at varying amounts into acrylate and styrene/acrylate dispersions. Said dendritic product was prior to said admixing dissolved in butyl diglycol acetate. The formulations and amounts are given in below table. Reference samples without said dendritic product were also prepared (Samples 1, 4 and 7). All amounts in below table are given in parts per weight.

Sample no.	1	2	3	4	5	6	7	8	9
FA 184 S	49.1	46.6	44.2	---	---	---	---	---	---
LDM 6048	---	---	---	55.0	52.3	49.5	---	---	---
LDM 7741	---	---	---	---	---	---	59.8	56.8	54.1
Prod. of Ex. 1	---	2.5	4.9	---	2.7	5.5	---	3.0	5.7
BDGA	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

FA 184 S = Mowilith® FA 184 S, acrylic dispersion, Clariant Emulsion Norden AB, Sweden.
LDM 6048 = Mowilith® LDM 6048, styrene/acrylic dispersion, Clariant Emulsion Norden AB, Sweden.
LDM 7741 = Mowilith® LDM 7741, acrylic dispersion, Clariant Emulsion Norden AB, Sweden.
BDGA = Butyldiglycol acetate.

The following dispersion characteristics were determined:

Sample no.	1	2	3	4	5	6	7	8	9
Viscosity 23°C, mPas *	390	560	630	6 360	12 700	13 280	220	490	590
Hardness, König secs.	28	13	11	24	20	21	108	31	29

* Brookfield.

Example 3

The dendritic product obtained in Example 1 was admixed at varying amounts into white paints based on acrylate and styrene/acrylate dispersions. Said dendritic product was prior to said admixing dissolved in butyl diglycol acetate. Formulations and amounts are given in below table. Reference samples without said dendritic product were also prepared (Samples 1, 4 and 7). All amounts in below table are given in parts per weight.

Sample no.	1	2	3	4	5	6	7	8	9
Mill base, gloss 70	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2
FA 184 S	49.1	46.6	44.2	---	---	---	---	---	---
LDM 6048	---	---	---	55.0	52.3	49.5	---	---	---
LDM 7741	---	---	---	---	---	---	59.8	56.8	54.1
Prod. of Ex. 1	---	2.5	4.9	---	2.7	5.5	---	3.0	5.7
BDGA	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Water	15.5	15.5	15.5	9.6	9.6	9.6	4.8	4.8	4.8

FA 184 S = Mowilith® FA184 S, acrylic dispersion, Clariant Emulsion Norden AB, Sweden.
LDM 6048 = Mowilith® LDM 6048, styrene/acrylic dispersion, Clariant Emulsion Norden AB, Sweden.
LDM 7741 = Mowilith® LDM 7741, acrylic dispersion, Clariant Emulsion Norden AB, Sweden.
BDGA = Butyldiglycol acetate.

The mill base used in the preparation of above paints had the following composition in parts per weight:

Titanium dioxide	69.5
Dispersing agent	1.6
Antifoam agent	0.7
Preservative	0.7
Low molecular weight cellulose thickerner, 5% in water	19.9
Water	7.6

The following paint characteristics were determined:

Sample no.	1	2	3	4	5	6	7	8	9
Viscosity, 23°C, mPas *	2 790	2 700	2 370	4 500	4 130	4 050	4 150	4 410	4 490
Blocking at 50% RH	2.0	0.4	0.4	4.0	0.7	0.5	4.0	0.5	0.5
Blocking at 70% RH	2.5	0.4	0.4	4.5	1.5	0.7	4.5	0.8	0.7

* Brookfield.
RH = Relative humidity.

Blocking was performed and evaluated according to following procedure:
Paint is applied using a 200 µm on foils and is allowed to dry at 23°C and 50% or 70% relative humidity for 16 hours. Samples having the dimensions 4 x 4 cm are cut out from said foils and placed two and two, with the coated surfaces facing each other, between glass plates and loaded with a 2 kg weight. The loaded samples are now placed in a heating cabinet holding a temperature of 50°C for 5 hours and subsequently cooled to room temperature. Evaluation of blocking is performed and judged by the ease to separate said samples. Judgement is visually performed according to a scale of 0-5, wherein 0 means no adhesion between the coated surfaces and/or no damage to the paint films.

Example 4

The dendritic product obtained in Example 1 was admixed at 2, 5 and 10% by weight into a vinyl acetate/ethylene dispersion. White paints where prepared from obtained mixtures. Formulations and amounts are given in below table. A reference sample without said dendritic product were also prepared (Sample 1). All amounts in below table are given in parts per weight.

Sample no.	1	2	3	4
Mill base, gloss 20	59.7	59.7	59.7	59.7
FE 174	40.0	---	---	---
FE 174 + 2% product of Ex. 1	---	40.0	---	---
FE 174 + 5% product of Ex. 1	---	---	40.0	---
FE 174 + 10% product of Ex. 1	---	---	---	40.0

FE 174 = Mowilith® FE 174, Vinyl acetate/ethylene dispersion, Clariant Emulsion Norden AB, Sweden.

The mill base used in the prepared paints had the following composition in part per weight:

Titanium dioxide	69.5
Kaolin	3.0
Filler	3.0
Dispering agent	0.5
Antifoam agent	0.3
Preservative	0.2
High molecular weight cellulose thickener, 2% in water	10.0
Low molecular weight cellulose thickener, 5% in water	20.0
Water	2.7

The following paint characteristics were determined:

Sample no.	1	2	3	4
Appearance	OK	OK	OK	OK
Gloss at 60°, 24 hours, %	36	34	30	25
Blocking, 5 hrs. at 50°C	1.0	0.5	0.5	0.75

Blocking test was performed according to following procedure:
Paint is applied using a 200 µm on foils and is allowed to dry at 23°C and 50% relative humidity for 16 hours. Samples having the dimensions 4 x 4 cm are cut out from said foils and placed two and two, with the coated surfaces facing each other, between glass plates and loaded with a 2 kg weight. The loaded samples are now placed in a heating cabinet holding a temperature of 50°C for 5 hours and subsequently cooled to room temperature. Evaluation of

blocking is performed and judged by the ease to separate said samples. Judgement is visually performed according to a scale of 0-5, wherein 0 means no adhesion between the coated surfaces and/or no damage to the paint films.

CLAIMS

1. A waterborne homo or copolymer dispersion
c h a r a c t e r i s e d i n, that it comprises 0.1-25%, such as 1-10% or 2-6%, by weight of at least one alkenyl functional dendritic polymer built up from a dendritic core polymer, which core polymer optionally is chain extended, and at least one alkenyl functional compound bonded to said core polymer and/or its optional chain extension, and that said alkenyl functional dendritic polymer is physically admixed into at least one homo or copolymer obtainable by polymerisation in an aqueous medium of at least one polymerisable allyl, vinyl, maleic or diene monomer.

2. A homo or copolymer dispersion according to Claim 1
c h a r a c t e r i s e d i n, that said homo or copolymer is yielded in a one stage emulsion polymerisation or copolymerisation.

3. A homo or copolymer dispersion according to Claim 1
c h a r a c t e r i s e d i n, that said homo or copolymer is a homo or copolymer yielded in a multi stage emulsion homo or copolymerisation.

4. A homo or copolymer dispersion according to Claim 2 or 3
c h a r a c t e r i s e d i n, that said emulsion copolymerisation yields latex particles having a heterogenous morphology, such as a core-shell morphology.

5. A homo or copolymer dispersion according to any of the Claims 1-4
c h a r a c t e r i s e d i n, that said at least one alkenyl functional dendritic polymer prior to admixing is dissolved or dispersed in at least one coalescent agent.

6. A homo or copolymer dispersion according to Claim 5
c h a r a c t e r i s e d i n, that said at least one coalescent agent is at least one glycol and/or a glycol ester and/or ether.

7. A homo or copolymer dispersion according to Claim 5 or 6
c h a r a c t e r i s e d i n, that said at least one coalescent agent is selected from the group consisting of propylene glycol, hexylene glycol, butyl glycol, butyl diglycol, 1-methoxy-2-propanol, 2,2,4-trimethyl-1,3-pentadiol monoisobutyrate, 2,2,4-trimethyl--1,3-pentanediol diisobutyrate, dipropylene glycol methyl ether, dipropylene glycol propyl ether, dipropylene glycol *n*-butyl ether, propylene glycol phenyl ether, tripropylene glycol monoisobutyrate, tripropylene glycol *n*-butyl ether, butyl glycol acetate and butyl diglycol acetate.

8. A homo or copolymer dispersion according to any of the Claims 1-7 characterised in, that said dendritic core polymer is a hydroxyfunctional dendritic polyester, polyether, polyesteramide or polyetheramide.

9. A homo or copolymer dispersion according to Claim 8 characterised in, that said dendritic core polymer is chain extended by addition of at least one alkylene oxide

10. A homo or copolymer dispersion according to Claim 9 characterised in, that said alkylene oxide is ethylene oxide, propylene oxide, 1,3-butylene oxide, 2,4-butylene oxide, cyclohexene oxide, butadiene monoxide and/or phenylethylene oxide.

11. A homo or copolymer dispersion according to any of the Claims 1-10 characterised in, that said alkenyl functionality is obtained by addition of at least one unsaturated carboxylic acid or a corresponding anhydride or halide.

12. A homo or copolymer dispersion according to any of the Claims 1-11 characterised in, that said alkenyl functionality is obtained by addition of acrylic acid, methacrylic acid, crotonic acid, isocrotonic acid or a to a said acid corresponding anhydride or halide.

13. A homo or copolymer dispersion according to any of the Claims 1-11 characterised in, that said alkenyl functionality is obtained by addition of maleic acid or anhydride and/or fumaric acid.

14. A homo or copolymer dispersion according to any of the Claims 1-11 characterised in, that said alkenyl functionality is obtained by addition of soybean fatty acid, linseed fatty acid, tall oil fatty acid, castor fatty acid, dehydrated castor fatty acid, sunflower fatty acid, oleic acid, linoleic acid and/or linolenic acid.

15. A homo or copolymer dispersion according to any of the Claims 1-11 characterised in, that said alkenyl functionality is obtained by addition of at least one unsaturated carboxyfunctional ester, polyester, ether or polyether

16. A homo or copolymer dispersion according to any of the Claims 1-11 characterised in, that said alkenyl functionality is obtained by reaction with at least one alkenyl halide, such as allyl chloride and/or allyl bromide.

17. A homo or copolymer dispersion according to any of the Claims 1-11 characterised in, that said alkenyl functionality is obtained by addition of an unsaturated carboxyfunctional ester of at least one saturated or unsaturated di, tri or polyfunctional carboxylic acid and at least one hydroxyfunctional allyl ether of at least one di, tri or polyhydric alcohol or at least one di, tri or polyhydric reaction product between at least one alkylene oxide and at least one hydroxyfunctional allyl ether of at least one di, tri or polyhydric alcohol.

18. A homo or copolymer dispersion according to Claim 17 characterised in, that said di, tri or polycarboxylic acid is selected from the group consisting of maleic acid, fumaric acid, tetrahydrophthalic acid, hexahydrophthalic acid, azeleic acid, adipic acid, trimelletic acid and a to a said acid corresponding anhydride.

19. A homo or copolymer dispersion according to any of the Claims 1-10 characterised in, that said alkenyl functionality is obtained by addition of an unsaturated carboxyfunctional ester of maleic acid or anhydride and/or fumaric acid at least one saturated or unsaturated di, tri or polyhydric alcohol or at least one di, tri or polyhydric reaction product between at least one alkylene oxide and at least one saturated or unsaturated di, tri or polyhydric alcohol.

20. A homo or copolymer dispersion according to any of the Claims 17-19 characterised in, that said at least one alkylene oxide is ethylene oxide, propylene oxide, 1,3-butylene oxide, 2,4-butylene oxide, cyclohexene oxide, butadiene monoxide and/or phenylethylene oxide.

21. A homo or copolymer dispersion according to any of the Claims 17-20 characterised in, that said di, tri or polyhydric alcohol is selected from the group consisting of 1,ω-diol, a 5,5-di(hydroxyalkyl)-1,3-dioxane, a 2-alkyl-1,3-propanediol, a 2,2-dialkyl-1,3-propanediol, a 2-hydroxy-1,3-propanediol, a 2-hydroxy-2-alkyl-1,3-propanediol, a 2-hydroxyalkyl-2-alkyl-1,3-propanediol, a 2,2-di(hydroxyalkyl)-1,3-propanediol and a dimer, trimer or polymer of a said di, tri or polyhydric alcohol.

22. A homo or copolymer dispersion according to Claim 21 characterised in, that said alkyl is C_1-C_{24} alkyl or C_2-C_{24} alkenyl, such as C_1-C_{12} or C_2-C_8 alkyl or alkenyl.

23. A homo or copolymer dispersion according to any of the Claims 17-20 characterised in, that said di, tri or polyhydric alcohol is selected from the group consisting of 1,4-butanediol, 1,5-pentanediol, 1,6-hexanediol, 1,6-cyclohexane dimethanol, 5,5-dihydroxymethyl-1,3-dioxane, 2-methyl-1,3-propanediol, 2-methyl-2-ethyl-1,3-propanediol, 2-ethyl-2-butyl-1,3-propanediol, neopentyl glycol, dimethylolpropane, 1,1-dimethylolcyclohexane, glycerol, trimethylolethane, trimethylolpropane, diglycerol, ditrimethylolethane, ditrimethylolpropane, pentaerythritol, dipentaerythritol, anhydroenneaheptitol, sorbitol and mannitol.

24. A homo or copolymer dispersion according to any of the Claims 1-10 characterised in, that said alkenyl functionality is obtained by reaction with at least one alkenyl halide, such as allyl chloride and/or allyl bromide.

25. A homo or copolymer dispersion according to any of the Claims 1-24 characterised in, that said polymerisable monomer is acrylic acid, methacrylic acid, crotonic acid, isocrotonic acid, itaconic acid, maleic anhydride and/or fumaric acid.

26. A homo or copolymer dispersion according to any of the Claims 1-24 characterised in, that said polymerisable monomer is glycidyl acrylate and/or glycidyl methacrylate.

27. A homo or copolymer dispersion according to any of the Claims 1-24 characterised in, that said polymerisable monomer is acrylamide, methacrylamide and/or ethyl imidazolidon methacrylate.

28. A homo or copolymer dispersion according to any of the Claims 1-24 characterised in, that said polymerisable monomer is a C_1-C_{10} alkyl acrylate or methacrylate, such as methyl acrylate, ethyl acrylate, butyl acrylate, 2-ethylhexyl acrylate, methyl methacrylate, ethyl methacrylate and/or butyl methacrylate.

29. A homo or copolymer dispersion according to any of the Claims 1-24 characterised in, that said polymerisable monomer is ethylene and/or propylene.

30. A homo or copolymer dispersion according to any of the Claims 1-24 characterised in, that said polymerisable monomer is styrene and/or divinylstyrene.

31. A homo or copolymer dispersion according to any of the Claims 1-24 characterised in, that said polymerisable monomer is vinylacetate, vinyl propionate, vinyl versatate and/or dibutyl maleate.

32. A homo or copolymer dispersion according to any of the Claims 1-24 characterised in, that said polymerisable monomer is butadiene and/or isoprene.

33. A copolymer dispersion according to any of the Claims 1-32 characterised in, that it comprises at least one polymerisable surfactant and/or a conventional surfactant.

34. A process for production of a waterborne homo or copolymer according to any of the Claims 1-33 characterised in, that said process comprises the Steps of (a) dissolving at least one alkenyl functional dendritic polymer in at least one coalescent agent and (b) subsequently physically admixing obtained solution into at least one homo or copolymer obtainable by polymerisation in an aqueous medium of at least one polymerisable allyl, vinyl, maleic or diene monomer.

35. Use of a waterborne homo or copolymer dispersion according to any of the Claims 1-33, in binders for coatings, such as decorative and/or protective paints and lacquers, adhesives and glues.

36. Use of a waterborne homo or copolymer dispersion obtained by the process according to Claim 34, in binders for coatings, such as decorative and/or protective paints and lacquers, adhesives and glues.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 03/01281

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: C09D 201/00, C08L 101/00 // C08G 63/06, C08F 2/24
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: C09D, C08L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, CHEM.ABS.DATA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 0233013 A1 (AVECIA LIMITED), 25 April 2002 (25.04.02), page 10, line 30 - page 11, line 37; page 13, line 36 - page 14, line 32; page 18, line 16 - page 19, line 14, page 20, line 22 - line 33; page 21, line 7 - line 35; page 22, line 16 - page 23, line 13, page 38 - page 39; page 41, line 24 - page 42, line 5; tables 1d,3a and 4, claims, abstract	1-8,14,25-36
Y	--	9-13,15-24
Y	WO 0064975 A1 (PERSTORP AB), 2 November 2000 (02.11.00), page 1 - page 2 first paragraph; page 3 second paragraph; page 4 fourth paragraph; examples, claims, abstract	9-13,15-24
A	--	1-8,14,25-36

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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"E" earlier application or patent but published on or after the international filing date
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 November 2003	25 -11- 2003
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Monika Bohlin/Els Telephone No. +46 8 782 25 00

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 03/01281

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 9723539 A1 (PERSTORP AB), 3 July 1997 (03.07.97), page 3 paragraph 2, page 5 paragraph 3, claims, abstract	9-13,15-24
A		1-8,14,25-36
	--	
A	US 5969030 A (SUNITHA GRANDHEE), 19 October 1999 (19.10.99), column 1, line 48 - line 59; column 2, line 44 - column 3, line 63, abstract, claims	3-4,25-36
	--	
A	WO 9730097 A1 (INDUSTRIES, INC.), 21 August 1997 (21.08.97), page 3, line 24 - page 4, line 2; page 5, line 9 - line 27; page 7, line 16 - line 22, page 8, line 17 - page 9, line 20; page 15, line 8 - line 12; examples; claims; abstract	1-36
	--	
A	EP 0899286 A1 (TOYO INK MANUFACTURING CO., LTD.), 3 March 1999 (03.03.99), page 2, line 14 - line 52; page 7, line 49 - line 52; page 18, line 43 - line 47, page 23, line 31 - line 45; page 24, line 41 - line 44; claims; abstract	1-36
	--	
A	SE 512020 C2 (PERSTORP SUPPORT AB), 2 March 2001 (02.03.01), claims 17-18, page 4 paragraph 5	1-36
	--	

INTERNATIONAL SEARCH REPORT

Information on patent family members

06/09/03

International application No.
PCT/SE 03/01281

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0233013 A1	25/04/02	AU 9402101 A	29/04/02
		EP 1328595 A	23/07/03
		GB 0025210 D	00/00/00
		US 2003191236 A	09/10/03
WO 0064975 A1	02/11/00	AU 749187 B	20/06/02
		AU 4631800 A	10/11/00
		AU 6014899 A	27/03/00
		CA 2339929 A	16/03/00
		EP 1109587 A	27/06/01
		JP 2002524155 T	06/08/02
		SE 514075 C	18/12/00
		SE 9901517 A	28/10/00
		US 6634360 B	21/10/03
WO 9723539 A1	03/07/97	AT 218149 T	15/06/02
		AT 224924 T	15/10/02
		AU 1219197 A	17/07/97
		AU 1219297 A	17/07/97
		DE 69621454 D,T	12/12/02
		DE 69623990 D,T	05/06/03
		DK 869984 T	27/01/03
		EP 0869983 A,B	14/10/98
		SE 0869983 T3	
		EP 0869984 A,B	14/10/98
		SE 9504652 D	00/00/00
		US 5990260 A	23/11/99
		WO 9723538 A	03/07/97
US 5969030 A	19/10/99	AU 692399 B	04/06/98
		AU 6063596 A	30/01/97
		CA 2181934 A	25/01/97
		CN 1146996 A	09/04/97
		EP 0755946 A	29/01/97
		JP 9221506 A	26/08/97
		US 5786420 A	28/07/98
WO 9730097 A1	21/08/97	US 5830928 A	03/11/98
		US 5972809 A	26/10/99
EP 0899286 A1	03/03/99	EP 0899287 A	03/03/99
		JP 2927291 B	28/07/99
		JP 3008936 B	14/02/00
		JP 3353677 B	03/12/02
		JP 11140042 A	25/05/99
		JP 11193315 A	21/07/99
		JP 11193317 A	21/07/99
		JP 2000026597 A	25/01/00
		JP 2002187947 A	05/07/02
		US 6136943 A	24/10/00
		US 6187897 B	13/02/01
		JP 11193316 A	21/07/99
		JP 11193318 A	21/07/99

INTERNATIONAL SEARCH REPORT
Information on patent family members

06/09/03

International application No.
PCT/SE 03/01281

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
SE 512020 C2	02/03/01	DE 69603324 D,T	30/12/99
		EP 0748950 A,B	18/12/96
		JP 3442570 B	02/09/03
		JP 8312710 A	26/11/96
		SE 9501847 A	19/11/96
		US 5810128 A	22/09/98