

(19)



(11)

EP 3 789 477 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

10.03.2021 Bulletin 2021/10

(51) Int Cl.:

C11D 3/00 (2006.01) **C11D 3/40** (2006.01)
C11D 3/50 (2006.01) **C11D 17/04** (2006.01)
C11D 17/06 (2006.01) **C11D 11/00** (2006.01)
D06M 13/00 (2006.01) **D06M 13/463** (2006.01)
D06M 23/12 (2006.01) **D06P 5/22** (2006.01)
D06M 13/11 (2006.01)

(21) Application number: **19195340.5**

(22) Date of filing: **04.09.2019**

(84) Designated Contracting States:

**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

Designated Extension States:

BA ME

Designated Validation States:

KH MA MD TN

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(54) **DYE SCAVENGING TEXTILE MATERIAL COMPRISING ENCAPSULATED PERFUMES**

(57) The present invention refers to a dye scavenging textile material comprising encapsulated perfumes, a method of preparing a textile material with scenting properties, the textile material obtained from this method as well as the use of the dye scavenging textile materials for providing color protection of and a scent to laundered fabrics in a washing process.

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Description

[0001] The present invention refers to a dye scavenging textile material comprising encapsulated perfumes, a method of preparing a textile material with scenting properties, the textile material obtained from this method as well as the use of the dye scavenging textile materials for providing color protection of and a scent to laundered fabrics in a washing process.

[0002] Laundry sheets are commonly used to deliver color protection to textiles in a washing process. Whereas known sheets focus on dye scavenging, there is still a need for the consumer to also obtain a fresh and/or pleasant scent experience when the textile is taken out of the washing machine and preferably also after a certain time period of storing the textiles, especially for cotton-based textiles.

[0003] Surprisingly, it has been found that a good color protection and long-lasting scent experience can be obtained, when the dye scavenging textile materials according to the present invention are used. These textile materials contain perfume microcapsules. The inventors of the present invention have furthermore surprisingly found that rotary screen printing is a suitable method to obtain perfume microcapsule loaded textile materials, which leads to an improved scent experience.

[0004] In a first aspect, the present invention refers to a dye scavenging textile material, preferably a nonwoven, woven or knitted fabric, a braided rope or ball, comprising, consisting essentially of or consisting of a water insoluble absorbent substrate comprising

- (a) at least one dye scavenging compound;
- (b) perfume microcapsules;
- (c) optionally at least one pigment; and
- (d) optionally at least one compound selected from surfactants, UV stabilizers, enzymes, binder, antifoaming agents or mixtures thereof.

[0005] In a second aspect, the present invention refers to a method of preparing a textile material, preferably a dye scavenging textile material, as defined herein, comprising the steps:

- (i) providing a water insoluble absorbent substrate, preferably a dye scavenging textile material,
- (ii) providing at least one aqueous composition comprising from 5 % by weight to 50 % by weight, based on the total weight of the solution, of perfume microcapsules and optionally further comprising at least one pigment,
- (iii) applying the aqueous composition onto the substrate, preferably with a rotary screen printing machine, preferably such that the amount of the aqueous composition on the substrate after the application is within a range from 1 gsm to 90 gsm.

[0006] In a third aspect, the present invention pertains to a textile material obtainable by the method according to the present invention.

[0007] Finally, in a fourth aspect, the present invention refers to the use of the dye scavenging textile material according to the present invention, preferably in form of a laundry sheet, for providing color protection and a scent to a textile in a washing process.

[0008] "One or more", as used herein, relates to "at least one" and comprises 1, 2, 3, 4, 5, 6, 7, 8, 9 or more of the referenced species. Similarly, "at least one" means "one or more", i.e. 1, 2, 3, 4, 5, 6, 7, 8, 9 or more. "At least one", as used herein in relation to any component, refers to the number of chemically different atoms or molecules, i.e. to the number of different types of the referenced species, but not to the total number of atoms or molecules. For example, "at least one pigment" means that at least one type of pigment can be part of the composition, but that also two or more different types of pigments can be present.

[0009] Numeric values specified without decimal places refer to the full value specified with one decimal place. For example, "99 %" means "99.0 %", if not stated otherwise.

[0010] The expressions "approx." or "about", in conjunction with a numerical value, refer to a variance of ± 10 % relative to the given numerical value, preferably ± 5 %, more preferably ± 1 %, if not explicitly stated otherwise.

[0011] All percentages given herein in relation to the compositions relate to weight-% (wt.-%) relative to the total weight of the respective composition, if not explicitly stated otherwise.

[0012] Numeric ranges specified in the format "in/from x to y" include the values specified. If several preferred numeric ranges are specified in this format, all ranges resulting from the combination of the different endpoints are also intended to be encompassed by the present invention.

[0013] "Absorbent", as used herein in relation to the substrate or textile material, means that said substrate can absorb other compounds, in particular the dye scavenging compounds, in liquid form, such as an aqueous composition. Said substrate may contain or consists of fibers, which each have said absorbent property. It is also contemplated that said

material only partially consists of fibers that have such absorbent properties and also comprises non-absorbent materials.

[0014] These and other aspects, features, embodiments, and advantages of the invention become apparent to the skilled person in the following detailed description and claims. Each feature or embodiment from one aspect of the invention can be used in any other aspect of the invention. Additionally, each feature of the textile material, method or use can be combined with any other feature or embodiment of the method, textile material or use. Furthermore, the examples contained herein are intended to describe and illustrate the invention, but do not restrict it and in particular, the invention is not limited to these examples.

[0015] The present invention relates to a dye scavenging textile material, preferably a nonwoven, woven or knitted fabric, a braided rope or ball, more preferably a laundry sheet, comprising, consisting essentially of or consisting of a water insoluble absorbent substrate comprising

(a) at least one dye scavenging compound;

(b) perfume microcapsules;

(c) optionally at least one pigment; and

(d) optionally at least one compound selected from surfactants, UV stabilizers, enzymes, binder, antifoaming agents or mixtures thereof.

[0016] Suitable and preferred compounds (a) to (d) will be described below and correspond to the respective compounds as employed in the method.

[0017] Furthermore, the present invention refers to a method of preparing a textile material, preferably a dye scavenging textile material, more preferably a laundry sheet, with perfuming properties, comprising the steps:

(i) providing a water insoluble absorbent substrate, preferably a dye scavenging textile material, more preferably as defined herein but without components (b) and optionally also without (c) and (d),

(ii) providing at least one aqueous composition comprising from 5 % by weight to 50 % by weight, preferably 8 % by weight to 40 % by weight, more preferably 10 % by weight to 30 % by weight, based on the total weight of the solution, of perfume microcapsules and optionally further comprising at least one pigment,

(iii) applying the aqueous composition onto the substrate, preferably with a rotary screen printing machine, preferably such that the amount of the aqueous composition on the substrate after the coating is within a range from 1 gsm to 90 gsm, more preferably from 1 gsm to 50 gsm, most preferably from 5 gsm to 30 gsm.

[0018] In various embodiments the aqueous composition comprises from 30 % by weight to 80 % by weight, preferably from 35 % by weight to 70 % by weight, more preferably from 50 % by weight to 65 % by weight, of water, based on the total weight of the solution. In various embodiments, the aqueous composition comprises water as the only solvent and is essentially free of other solvents, such as organic solvents. "Free of" or "essentially free of", as used herein interchangeably in relation to a specific type of component, means that the referenced composition does not contain the respective component in deliberately added form. In various embodiments, this means that the respective component is present in concentrations of no more than 1 wt.%, preferably no more than 0.5 wt.%, more preferably no more than 0.1 wt.% of said component relative to the total weight of the composition. Most preferably, said component is not contained at all.

[0019] In various embodiments the aqueous composition comprises from 5 % by weight to 50 % by weight, preferably 8 % by weight to 40 % by weight, more preferably 10 % by weight to 30 % by weight perfume microcapsules, based on the total weight of the solution. As the perfume microcapsules are typically water-insoluble, the aqueous composition is typically provided in form of a dispersion of the perfume microcapsules in the continuous aqueous phase. Such dispersions are also referred to as slurries herein.

Water insoluble absorbent substrate

[0020] The water insoluble absorbent substrate, herein also only referred to as "substrate", is generally a textile material itself and can be a nonwoven, woven or knitted fabric, a braided rope or ball, preferably a woven, knitted or non-woven material and more preferably be provided in form of a sheet. Preferably the substrate is a non-woven, especially a cellulose-based non-woven. Said substrate, in particular said non-woven, can be coated or uncoated prior to the application of the aqueous composition according to step (iii) of the present invention.

[0021] Preferably the substrate comprises a material which provides free hydroxyl groups on the surface of the substrate. The substrate can consist of one single material, but it can also comprise mixtures of different materials. Preferably, the substrate comprises cellulosic and/or synthetic fibers. For example, a blend of viscose and pulp fibers might be used. Also mixtures of cellulosic fibers and synthetic fibers or pulp fibers and viscose and synthetic fibers might be used. Also contemplated are substrates consisting essentially or only of cellulosic fibers/materials.

[0022] Suitable absorbent fibers are, without limitation, cellulosic fibers, i.e. comprise or consist of cellulose or are pulp fibers. In various embodiments, the substrate comprises cellulosic type fibers, such as linen, cotton (blends of different cotton are possible), or viscose. One specific example is lyocell. The fibers can be natural or regenerate cellulose-based fibers, such as cotton or rayon, or mixtures of natural and regenerate fibers. Particularly suitable are regenerated cellulose fibers, such as viscose, modal and lyocell or combinations thereof. In various embodiments, the fibers used are made from purified cellulose, in particular cellulose that contains less than 10% by weight of other components, such as hemicellulose or lignin. It is preferred that the cellulose from which the fibers are formed is essentially free of hemicellulose and lignin. It is also preferred that the fibers used in the textile materials and methods described herein are not wood pulp. In any case, the fibers used herein are water-insoluble, i.e. they do not dissolve in water under the given conditions, but remain in solid form.

[0023] Methods to produce such regenerate cellulose fibers are well-known in the art and involve the chemical conversion of purified cellulose, for example from wood pulp or other natural sources, into a soluble compound, which is then dissolved and forced through a spinneret to produce filaments which are chemically solidified, resulting in fibers.

[0024] Suitable lyocell fibers are for example marketed under the Tencel® brand by Lenzing, AT.

[0025] While the fibers are preferably cellulose-based, it is similarly possible to use fibers that comprise or consists of cellulose derivatives, such as cellulose ester, in particular cellulose acetate.

[0026] Suitable synthetic fibers include, without limitation, polypropylene, polyethylene, polyamides, polyesters, or polyolefins. Any diameter or denier of fiber can be used in the present invention. Suitable, without being limited thereto, are fibers having 1.0 to 2.0 dtex, preferably 1.2 to 1.5 dtex and/or 30 to 45 mm dull, preferably 35 to 42 dull. The substrate may further comprise additional fibers, preferably natural fibers, such as pulp fibers. The sheet might be wet-laid or spun-laid, defined by the length of the fibers. It is preferred that the fibers have a length of about from 2 mm to 5 mm for wet-laid non-wovens and/or from 30 mm to 50 mm for spun-laid non-wovens. In any of the embodiments described herein, all the fibers may be in form of a yarn.

[0027] In various embodiments, the substrate is a cellulosic-based non-woven, especially a lyocell substrate, which can comprise further natural fibers, especially pulp fibers. The further natural fibers, if present, may be different from the cellulosic fibers.

[0028] In various embodiments, the textile material is at least partially made from fibers of a cellulosic material, but can be a composite material in that it also comprises non-cellulosic material. Accordingly, the material may comprise a naturally occurring material or a synthetic material or a mixture thereof.

[0029] The textile material may additionally comprise a binder such as polyvinylacetate, although in various embodiments no such a binder is included.

[0030] The textile material is preferably formed to a density of 40-200 g/m², 40-80 g/m², 55-75 g/m², or 60-75 g/m², more preferably about 65g/m². The values apply to the textile material in its ready-to-use form, i.e. its dry form. The density can be determined according to ISO 9073-1 (of the year 1989). Such a density is preferred as respective textile sheets have an improved performance compared with other sheets, as they can absorb large amounts of dyes from the washing liquor in short times compared with other dye catching laundry sheets. At the same time, the sheets are still flexible and water permeable, so that they provide for consumer acceptance and allow to add them to delicate textile fabrics such as microfiber fabrics or others.

[0031] The textile material may take the form of a cloth or laundry sheet. The dimensions of the material, once cut for use in a domestic wash, may range from are about 20-30 cm in one direction and 10-20 cm in the other direction, such as, for example, about 25 cm x about 12 cm. It will, however, be appreciated that any other suitable dimensions may be used.

[0032] The textile material typically is selected such that it has sufficient wet strength and sufficient resistance to abrasion with other materials in a bath such as laundry wash or rinse waters. Consequently, the textile materials of the present application are strong and robust to be suitable for all washing machine types.

[0033] Strength and robustness might be defined by the tensile strength. Tensile strength refers to the resilience of the sheet against ripping. The direction of tensile strength can be distinguished between machine direction (MD) and cross direction (CD). When the textile material, for example in form of a cloth or laundry sheet, is produced, the lengthwise direction (direction of production) is the machine direction. The direction rectangular thereto is the cross direction. Relevant is of course also the tensile strength in respect of moisture. Thus, the sheets should be robust and stable if wet (i.e. if immersed for 10 seconds in water) as well as if dry (as obtained by a supplier). Thus, the textile material has, if wet, preferably a tensile strength in machine direction (MD) from 200 N/m to 1500 N/m, preferably from 400 N/m to 1400 N/m, especially from 600 N/m to 1300 N/m, especially preferred from 750 N/m to 1200 N/m and/or in cross direction (CD) from 50 N/m to 1000 N/m, preferably from 100 N/m to 800 N/m, especially preferred from 150 N/m to 500 N/m. If dry, it preferably has a tensile strength in machine direction (MD) from 1200 N/m to 2800 N/m, preferably from 1400 N/m to 2600 N/m, especially from 1500 N/m to 2400 N/m, especially preferred from 1600 N/m to 2200 N/m and/or in cross direction (CD) from 200 N/m to 1500 N/m, preferably from 250 N/m to 1000 N/m, especially from 300 N/m to 800 N/m.

[0034] The substrate can be coated or impregnated with a dye scavenging compound. Due to the absorbent properties

of the substrate the dye scavenger is typically absorbed into or onto the textile substrate material, such as the individual fibers. Suitable dye scavenging coatings are mentioned in the prior art, e.g. in PCT/EP2017/050080, the content of which is enclosed herein by reference in its entirety. The substrate used in the methods described herein may be a substrate that has been treated with a dye scavenging compound, for example has been prepared according to the methods described in PCT/EP2017/050080.

[0035] The purpose of the textile material is to provide a carrier for the perfume microcapsules and the dye scavenging material, and to provide a sufficient area over which said perfume microcapsules/dye scavenging materials are accessible to the liquid in the bath or wash water in which the dye scavenging textile material is to be used. Preferred applications are in laundry applications, in particular in automatic washing machines, such as front loaders or top loaders widely used.

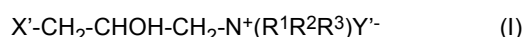
Dye scavenging compound

[0036] The textile material has dye scavenging property, which can be obtained by the use of suitable dye scavenging compounds, such as polyamines, or GMAC (glycidyltrimethylammoniumchloride), or a precursor of GMAC, such as 3-chloro-2-hydroxypropyltrimethylammonium chloride. Specific examples of suitable dye scavenging compounds include GMAC and precursors thereof.

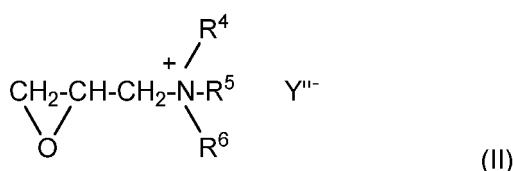
[0037] The at least one dye scavenging compound is typically absorbed onto the substrate. This substrate can then be used in step (i) in the method according to the present invention. Therefore, step (i) of the method according to the invention may comprise in a preferred embodiment:

- (ia) providing at least one dye scavenging compound, preferably GMAC or a precursor thereof, in a solution,
(ib) applying the at least one dye scavenging compound to a water-insoluble absorbent substrate and afterwards drying the substrate, and
(ic) providing the thus obtained dye scavenging water insoluble absorbent substrate for the following method steps.

[0038] Further suitable dye scavenging compounds include, but are not limited to, N-trisubstituted ammonium-2-hydroxy-3-halopropyl compounds having the general formula (I):



wherein R¹, R², R³ are each independently methyl, ethyl, propyl, butyl, benzyl or a hydroxyl substituted derivative thereof, X' is a halogen atom, and Y⁻ is chloride, bromide, sulfate or sulfonate, or a salt of epoxy propyl ammonium having the general formula (II):



wherein R⁴, R⁵, R⁶ and Y''- have the same meaning as R¹, R², R³ and Y'-, respectively, as defined above.

[0039] In various embodiments, the dye scavenging compound is a compound of formula (I) or (II), wherein R¹, R², R³ or R⁴, R⁵, R⁶ are each independently methyl, ethyl, propyl, butyl, benzyl or a hydroxyl substituted derivative thereof, preferably methyl, ethyl, n-propyl or n-butyl, more preferably methyl or ethyl, most preferably methyl. X' is a halogen atom, preferably selected from Cl or Br.

[0040] Y⁻ and/or Y^{m-} are selected from chloride, bromide, sulfate or sulfonate, preferably chloride. It is understood that when Y⁻ or Y^{m-} is a sulfate or sulfonate anion, that this refers to ½ sulfate/sulfonate ion, i.e. that the anion is shared by two positively charged ammonium compounds.

[0041] The dye scavenging compound is preferably a salt of epoxy propyl ammonium having the general formula (II), preferably a glycidyltrimethylammonium salt, also known as (2,3-epoxypropyl)trimethylammonium salt, more preferably the chloride salt, available in solid form or as a 72% aqueous composition from Sigma Aldrich, wherein R⁴, R⁵, R⁶ are each methyl and Y³⁻ is chloride.

[0042] Alternatively, the compound may be a compound of formula (I), for example 3-chloro-2-hydroxypropyltrimethylammonium chloride, available from Sigma Aldrich, wherein R¹, R², R³ are each methyl, X' is chlorine, and Y⁻ is chloride.

[0043] It is of course also encompassed that more than one compound of formula (I) or (II) are used in combination or that the compound is used in combination with another dye scavenging compound not of formula (I) or (II).

[0044] The dye scavenging compound may be applied to, absorbed by or impregnated into the textile materials or the

fibers of the textile substrate. To achieve this, the dye scavenging compound can be applied to the material/fibers in form of an aqueous solution, such as an alkaline aqueous solution comprising a base and optionally further comprising at least one surface active agent to improve wetting of the material/fibers. Suitable surface active agents are known in the art. The aqueous solution may be contacted with the material/fibers by any suitable means, for example by dipping or submerging the material/fibers in the bath or by spraying the solution onto the material/fibers. The step may be carried out continuously in that the material/fibers are passed by a suitable means through a bath of the solution or the solution is sprayed onto the material/fibers while they are transported. In various embodiments, the alkaline solution of the dye scavenging compound comprises a basic solution comprising water and a base, such as NaOH. In various embodiments, the caustic solution for use in the preparation of the alkaline solution comprises water and the base, such as NaOH, in a range by weight of from 5% NaOH to 50% NaOH or 2-40% NaOH or 5-35% NaOH or about 5% or about 30% NaOH. The water and the base (e.g. NaOH) in the caustic solution used for preparation of the alkaline solution may alternatively be used in a respective ratio by weight of from about 10:90 to about 50:50, preferably from about 80:20 to about 60:40, more preferably about 70:30 water:base. The caustic solution may be a 30% solution of NaOH available under the trade name Caustic Soda Liquor from Micro-Bio (Ireland) Ltd, Industrial Estate, Fermoy, County Cork, Ireland.

[0045] The alkaline solution may comprise a final ready-to-use concentration of NaOH of about 0.5 to about 5% by weight relative to the total weight of the solution, for example about 0.6 to about 3.0% or about 0.7 to about 2.0 or about 0.8 to about 1.5 or about 0.9 to about 1.1 % by weight. This may for example mean that 3% of a 30% caustic solution of NaOH in water is used.

[0046] The alkaline solution in various embodiments comprises the dye scavenging compound in an amount of from 0.5 to 20 % by weight, for example 1 to 15 % by weight or 2 to 12 % by weight, for example about 6, 7, 8, 9, 10, 11 or 12 % by weight. In various embodiments, the ratio of the dye scavenger to the remaining parts of the alkaline solution, namely the basic solution (comprising water and the base and optional additional components, such as surfactants), by weight ranges of from about 0.02:1 to about 0.5:1, for example 0.05:1 to about 0.2:1. It will be appreciated that these ratios typically refer to the dye scavenging compound in solid form, preferably to glycidyltrimethylammonium chloride.

[0047] The dye scavenging compound, such as those of formula (I) and/or (II), is preferably used in an amount such that in the final textile material, it is present in amounts of from about 4.4 g to about 5.5 g, or from about 4.6 g to about 5.1 g, or about 4.9 g per square meter (m²) of the final textile material. "Final textile material", as used herein, refers to the textile material in its ready to use form, i.e. in its dry form. In various embodiments, the amount of the dye scavenging compounds in the final textile material ranges from 5 to 20 % by weight of the textile material, for example 10 to 15% by weight.

[0048] After the substrates/fibers have been contacted with the dye scavenging compound in form of an alkaline solution, they may be contacted with an acid solution, for example, but without limitation, by passing it through a bath containing an acid solution. Alternatively, the acid solution may be applied by other means, such as those described above for the alkaline solution. The acid solution may comprise water and an acid, such as a hydrochloric acid (HCl) solution, such as a 4-12 M, for example about 4.3 to about 5 or about 11.6 M, HCl solution. The acid solution may have a pH from about 1.5 to about 2.5, such as a pH of about 2.1. A pH probe may be placed in the bath containing the acid solution in order to maintain the pH at about 2.1. Thus, the pH probe conveniently signals the water requirement and this is dosed when required to give the correct pH automatically.

[0049] The acid solution may also contain a neat perfume and/or a non-ionic surfactant, such as an alkoxyated fatty alcohol (FAEO). Alternatively, such components may be used to treat the textile material/fibers in a later step

[0050] After contacting with the solutions described above, the material/fibers may be dried, for example by subjecting them to pressure to remove the liquid from the material/fibers. Said pressure may be applied by passing the textile material/fibers through rollers, e.g. a pair of rollers, optionally pneumatically actuated rollers, or using an air manifold to maintain constant and consistent air pressure. The material/fibers may be further dried, in such a drying step they may be subjected to a drying temperature from about 95 °C to about 125 °C, such as from about 100 °C to about 120 °C. The substrate may be dried by passing the substrate along one or more drying cylinders, which drying cylinders are optionally at a temperature of from about 95 °C to about 125 °C, such as from about 100 °C to about 120 °C.

[0051] The fibers treated as described above can be used to form a textile material. The textile material may be any textile material, including, without limitation, a woven, non-woven or knitted fabric, a braided rope or ball or any other desirable configuration. Alternatively, as also described above, the already formed textile material, i.e. the substrate, is subjected to the above-described treatment.

[0052] The substrate/textile materials with dye scavenging compounds may then be further treated as described herein to be loaded with perfume microcapsules. In various embodiments, the steps of applying the dye scavengers and applying the perfume microcapsules are thus separate steps.

Perfume microcapsules

[0053] The perfume microcapsules contain encapsulated perfume oil.

[0054] In various embodiments, the perfume microcapsules are the only fragrance compounds present in the aqueous composition or the dye scavenging textile material according to the present invention. In such embodiments, essentially no free, i.e. non-encapsulated, perfumes or perfume oils are present in the aqueous composition or dye scavenging textile material. In some embodiments, the presence of free perfume oils may impair the printing process. However, the aqueous solution may include some amounts of free perfume oils, which might be present in the aqueous composition due to leakage from the perfume microcapsules or incomplete encapsulation. These amounts typically range up to 10 wt.-% relative to the total weight of the microcapsule slurry or aqueous composition, in some exemplary embodiments up to 7 wt.-% or up to 5 wt.-%.

[0055] In the context of the present invention, the terms "perfume oil" or "perfume", which are interchangeably used, refer to individual fragrance or perfume compounds or mixtures of several such compounds, and thus comprise, for example, synthetic products of the ester type, ethers, aldehydes, ketones, alcohols and hydrocarbons, as well as natural fragrance mixtures, which are for example available from plant sources.

[0056] A perfume is an odor-causing chemical substance. In order to stimulate the sense of smell, the chemical substance should be at least partially redistributable in the air, i.e. the perfume should for example be volatile at 25 °C, at least to a small extent. In one embodiment, therefore, the perfume oil has a melting point in the range of -100 °C to 100 °C, preferably from -80 °C to 80 °C, more preferably from -20 °C to 50 °C, especially of 30 °C to 20 °C. In a further embodiment, the perfume oil has a boiling point ranging from 25 °C to 400 °C, preferably from 50 °C to 380 °C, more preferably from 75 °C to 350 °C, especially from 100 °C to 330 °C.

[0057] In general, a chemical substance should not exceed a certain molecular weight to act as a perfume, since the required volatility can no longer be guaranteed, if it has a too high molecular mass. In one preferred embodiment, the fragrance has a molecular weight of 40 to 700 g/mol, more preferably 60 to 400 g/mol.

[0058] The smell of a perfume is perceived by most people as pleasant and often corresponds to the smell of, for example, flowers, fruits, spices, bark, resin, leaves, grasses, mosses and roots. Thus, perfumes can also be used to superimpose unpleasant odors or even to provide a non-smelling substance with a desired odor.

[0059] According to the present invention, suitable fragrance compounds to form the perfumes described herein may include, without limitation, an aldehyde, for example selected from adoxal (2,6,10-trimethyl-9-undecenal), anisaldehyde (4-methoxybenzaldehyde), cymal (3-(4-isopropyl-phenyl)-2-methylpropanal), ethylvanillin, florhydral (3-(3-isopropylphenyl) butanal), helional (3-(3,4-methylenedioxyphenyl)-2-methylpropanal), heliotropin, hydroxycitronellal, lauraldehyde, lyral (3- and 4-methylpropanal) - (4-hydroxy-4-methylpentyl) -3-cyclohexene-1-carboxaldehyde, methylnonylacetaldehyde, Lillial (3- (4-tert-butylphenyl) -2-methylpropanal), phenylacetaldehyde, undecylenealdehyde, vanillin, 2,6,10-trimethyl-9-undecenal, 3-dodecen-1-al, alpha-n-amylicinnamaldehyde, melonal (2,6-dimethyl-5-heptenal), 2,4-dimethyl-3-cyclohexene-1-carboxaldehyde (Triplal), 4-methoxybenzaldehyde, benzaldehyde, 3-(4-tert-butylphenyl)-propanal, 2-methyl-3-(para-methoxyphenyl)propanal, 2-methyl-4-(2,6,6-trimethyl-2 (1)-cyclohexen-1-yl)butanal, 3-phenyl-2-propenal, cis- / trans-3,7-dimethyl-2,6-octadien-1-al, 3,7-dimethyl-1-6-octen-1-al, [(3,7-dimethyl-6-octenyl)oxy]acetaldehyde, 4-isopropylbenzylaldehyde, 1,2,3,4,5,6,7,8-octahydro-8,8-dimethyl-2-naphthaldehyde, 2,4-dimethyl-3-cyclohexene-1-carboxaldehyde, 2-methyl-3-(isopropylphenyl)propanal, 1-decanal, 2,6-dimethyl-5-heptenal, 4-(tricyclo-[5.2.1.0(2,6)] decylidene-8)-butanal, octahydro-4,7-methane-1H-indenecarboxaldehyde, 3-ethoxy-4-hydroxybenzaldehyde, para-ethyl-alpha, alpha-dimethylhydrocinnamaldehyde, alpha-methyl-3,4-(methylenedioxy)-hydrocinnamaldehyde, 3,4-methylenedioxybenzaldehyde, alpha-n-hexylcinnamaldehyde, m-cymene-7-carboxaldehyde, alpha-methylphenylacetaldehyde, 7-hydroxy-3,7-dimethyloctanal, undecenal, 2,4,6-trimethyl-3-cyclohexene-1-carboxaldehyde, 4-(3)(4-methyl-3-pentenyl)-3-cyclohexenecarboxaldehyde, 1-dodecanal, 2,4-dimethylcyclohexene-3-carboxaldehyde, 4-(4-hydroxy-4-methylpentyl)-3-cyclohexene-1-carboxaldehyde, 7-methoxy-3,7-dimethyloctan-1-al, 2-methylundecanal, 2-methyldecanal, 1-nonanal, 1-octanal, 2,6,10-trimethyl-5,9-undecadienal, 2-methyl-3-(4-tert-butyl)propanal, dihydrocinnamaldehyde, 1-methyl-4-(4-methyl-3-pentenyl)-3-cyclohexene-1-carboxaldehyde, 5- or 6-methoxy-hexahydro-4,7-methanindan-1 or 2-carboxaldehyde, 3,7-Dimethyloctan-1-al, 1-undecanal, 10-undecene-1-al, 4-hydroxy-3-methoxybenzaldehyde, 1-methyl-3-(4-methylpentyl)-3-cyclohexenecarboxaldehyde, 7-hydroxy-3J-dimethyl-octanal, trans-4-decenal, 2,6-nonadienal, para-tolylacetaldehyde, 4-methylphenylacetaldehyde, 2-methyl-4-(2,6,6-trimethyl-1-cyclohexen-1-yl)-2-butanal, ortho-methoxycinnamaldehyde, 3,5,6-trimethyl-3-cyclohexene carboxaldehyde, 3J-dimethyl-2-methylene-6-octenal, phenoxyacetaldehyde, 5,9-dimethyl-4,8-decadienal, peonyaldehyde (6,10-dimethyl-3-oxa-5,9-undecadiene-1-al), hexahydro-4,7-methanindane-1-carboxaldehyde, 2-methyl-octanal, alpha-methyl-4-(1-methylethyl)-benzylacetaldehyde, 6, 6-dimethyl-2-norpinen-2-propionaldehyde, para-methylphenoxyacetaldehyde, 2-methyl-3-phenyl-2-propene-1-al, 3,5,5-trimethylhexanal, hexahydro-8,8-dimethyl-2 -naphthaldehyde, 3-propyl-bicyclo [2.2.1] -hept-5-ene 2-carbaldehyde, 9-decenal, 3-methyl-5-phenyl-1-pentanal, methylnonylacetaldehyde, hexanal and / or trans-2-hexenal.

[0060] Further suitable fragrance compounds include ketones, for example selected from methyl-beta-naphthyl ketone, muskadanone-1,2,3,5,6,7-hexahydro-1,1,2,3,3- pentamethyl-4H-inden-4-one), tartalide (6-acetyl-1,1,2,4,4,7-hexamethyltetralin), alpha-damascone, beta-damascone, delta-damascone, iso-damascone, damascenone, methyl dihydrojasmonate, menthone, carvone, camphor, koavon (3,4,5,6,6-pentamethylhept-3-en-2-one), fenchone, alpha-ionone, betalonone, gamma-methyl-ionone, fleuramon (2-heptylcyclopene-tanone), dihydrojasmon, cis-jasmone, iso-E-Super

(1-(1,2,3,4,5,6,7,8-octahydro-2,3,8,8-tetramethyl-2-naphthalenyl)-ethan-1-one (and isomers)), methyl cinnyl ketone, acetophenone, methyl acetophenone, para-methoxy acetophenone, methyl beta-naphthyl ketone, benzyl acetone, benzophenone, para-hydroxyphenyl butanone, celery ketone (3-methyl-5-propyl-2-cyclohexenone), 6-isopropyldecahydro-2-naphthone, dimethyloctenone, frescomethylene (2-butan-2-yl-cyclohexan-1-one), 4-(1-ethoxyvinyl)-3,3,5,5-tetramethylcyclo-1-hexanone, methylheptenone, 2-(2-(4-methyl-3-cyclohexen-1-yl)-propyl) cyclopentanone, 1-(p-menthene-6(2)-yl)-1-propanone, 4-(4-hydroxy 3-methoxyphenyl)-2-butanone, 2-acetyl-3,3-dimethylnorbornane, 6,7-dihydro-1,1,2,3,3-pentamethyl-4 (5H) -indanone, 4-damascol, dulciny (4-(1,3-benzodioxol-5-yl) butan-2-one), hexalone (1-(2,6,6-trimethyl-2-cyclohexene-1-yl)-1,6-heptadiene-3-one), isocyclone E (2-acetonaphthone-1,2,3,4,5,6,7,8-octahydro-2,3,8,8-tetramethyl), methylonyl ketone, methylcyclocitron, methylavederketone, Orivon (4-tert-Amylcyclohexanone), 4-tert-butylcyclohexanone, dolphone (2-pentylcyclopentanone), muscone (CAS 541-91-3), neobutenone (1-(5,5-dimethyl-1-cyclohexenyl)pent-4-en-1-one), Plicaton (CAS 41724-19-0), Veloutone (2,2,5-trimethyl-5-pentylcyclopentan-1-one), 2,4,4,7-tetramethyl-oct-6-en-3-one and / or tetrameran (6,10-dimethylundecen-2-one).

[0061] Suitable fragrance alcohols include, but are not limited to, 10-undecen-1-ol, 2,6-dimethylheptan-2-ol, 2-methylbutanol, 2-methylpentanol, 2-phenoxyethanol, 2-phenylpropanol, 2-tert-butylcyclohexanol, 3,5,5-trimethylcyclohexanol, 3-hexanol, 3-methyl-5-phenyl-pentanol, 3-octanol, 3-phenyl-propanol, 4-heptenol, 4-isopropyl cyclohexanol, 4-tert-butylcyclohexanol, 6,8-dimethyl-2-nonanol, 6-nonene-1-ol, 9-decen-1-ol, α -methylbenzyl alcohol, α -terpineol, amyl salicylate, benzyl alcohol, benzyl salicylate, β -terpineol, butyl salicylate, citronellol, cyclohexyl salicylate, decanol, dihydromyrcenol, dimethylbenzylcarbinol, dimethylheptanol, dimethyloctanol, ethyl salicylate, ethylvaniline, eugenol, farnesol, geraniol, heptanol, hexyl salicylate, isoborneol, isoeugenol, isopulegol, linalool, menthol, myrtenol, n-hexanol, nerol, nonanol, octanol, p-menthane-7-ol, phenylethyl alcohol, phenol, phenyl salicylate, tetrahydrogeraniol, tetrahydrolinalool, Thymol, trans-2-cis-6-nonadecanol, trans-2-nonen-1-ol, trans-2-octenol, undecanol, vanillin, Champiniol, hexenol and / or cinnamyl alcohol.

[0062] In some embodiments, the perfume may be a fragrance of natural or synthetic origin, including esters, ethers, aldehydes, ketones, alcohols and hydrocarbons. Fragrance compounds of the ester type are e.g. Benzyl acetate, phenoxyethyl isobutyrate, p-tert-butylcyclohexyl acetate, linalyl acetate, dimethylbenzylcarbonylacetate (DMBCA), phenylethylacetate, benzylacetate, ethylmethylphenylglycidate, allylcyclohexylpropionate, styrylpropionate, benzylsalicylate, cyclohexylsalicylate, floramate, melusate and jasmacylate. The ethers include, for example, benzyl ethyl ether and ambroxane, the aldehydes include, e.g., the linear alkanals having 8 to 18 carbon atoms, citral, citronellal, citronellyloxyacetaldehyde, cyclamenaldehyde (3-(4-propan-2-ylphenyl) butanal), Lilial and Bourgeonal. The alcohols include anethole, citronellol, eugenol, geraniol, linalool, phenylethyl alcohol and terpineol. The hydrocarbons include mainly terpenes such as limonene and pinene.

[0063] In some embodiments, the perfume may be an essential oil such as angelica root oil, aniseed oil, arnica blossom oil, basil oil, bayoil, champacilla oil, citrus oil, pinecone oil, pinecone oil, elemi oil, eucalyptus oil, fennel oil, pine needle oil, galbanum oil, geranium oil, ginger grass oil, guaiac wood oil, Gurjar balm oil, Helichrysum oil, Ho oil, ginger oil, iris oil, jasmin oil, cajeput oil, calamus oil, chamomile oil, camphor oil, kanaga oil, cardamom oil, cassia oil, pine oil, copaiba balsam, coriander oil, spearmint oil, caraway oil, cumin oil, labdanum oil, lavender oil, lemongrass oil, linden flower oil, lime oil, Tangerine oil, lemon balm oil, mint oil, musk oil, muscat oil, myrrh oil, clove oil, neroli oil, niaouli oil, olibanum oil, orange blossom oil, orange peel oil, organum oil, palmarosa oil, patchouli oil, balsam oil, petitgrain oil, pepper oil, peppermint oil, pimento oil, pine oil, rose oil, rosemary oil, sage oil, Sandalwood, celery oil, spiked oil, star aniseed oil, turpentine oil, thuja oil, thyme oil, verbena oil, vetiver oil, juniper berry oil, wormwood oil, wintergreen oil, ylang-ylang oil, hyssop oil, cinnamon oil, cinnamon oil, citronella oil, lemon oil and cypress oil, as well as ambrettolide, ambroxan, alpha Amyl cinnamaldehyde, anethole, anisaldehyde, anisalcohol, anisole, methyl anthranilate, acetophenone, benzylacetone, benzaldehyde, ethyl benzoate, benzophenone, benzyl alcohol, benzyl acetate, benzyl benzoate, benzyl formate, benzyl valerate, borneol, bornyl acetate, Boisambrene forte, alpha-bromostyrene, n-decyl aldehyde, n-dodecyl aldehyde, Eugenol, eugenol methyl ether, eucalyptol, farnesol, fenchone, fenchyl acetate, geranyl acetate, geranyl formate, heliotropin, hepticarboxylic acid methyl ester, heptaldehyde, hydroquinone dimethyl ether, hydroxycinnamaldehyde, hydroxycinnamyl alcohol, indole, iron, isoeugenol, isoeugenol methyl ether, isosafrole, jasmon, camphor, Karvakrol, Karvon, p-Cresol methyl ether, coumarin, p-methoxyacetophenone, methyl-Na methyl ketone, methyl methyl methylate, p-methylacetophenone, methylchloravanol, p-methylquinoline, methyl-beta-naphthylketone, methyl-n-nonylacetalddehyde, methyl-n-nonyl ketone, muscon, beta-naphthoethyl ether, beta-naphthol methyl ether, nerol, n-nonylaldehyde, Nonyl alcohol, n-octylaldehyde, p-oxyacetophenone, pentadecanolide, beta-phenylethyl alcohol, phenylacetic acid, pulegone, safrole, isoamyl salicylate, methyl salicylate, hexyl salicylate, cyclohexyl salicylate, santalol, sandelice, skatole, terpineol, thymes, thymol, troenan, gamma-undelactone, vanillin, veratrum aldehyde, cinnamaldehyde, cinnamyl alcohol, cinnamic acid, cinnamic acid ethyl ester, cinnamic acid benzyl ester, diphenyloxide, limonene, linalool, linalyl acetate and propionate, melusate, menthol, menthone, methyl-n-heptenone, pinene, phenylacetaldehyde, terpinyl acetate, citral, citronellal and mixtures thereof.

[0064] It is also possible to use mixtures of the above-mentioned fragrance compounds, essential oils and perfumes.

[0065] A "microcapsule", as used herein, relates to an essentially spherical structure typically having a core-shell

morphology, wherein in particular at least one perfume oil, as defined above, is present in the core. The core may be in solid form or viscous form, for example, having a waxy structure.

[0066] In the context of the present invention, particular preference is given to capsules which have a mean diameter d_{50} of $< 250 \mu\text{m}$, preferably 1 to $100 \mu\text{m}$, preferably 5 to $80 \mu\text{m}$, particularly preferably 10 to $50 \mu\text{m}$ and in particular 15 to $40 \mu\text{m}$. The d_{50} value indicates the diameter which results when 50% by weight of the capsules have a smaller diameter and 50% by weight of the capsules have a larger diameter than the d_{50} value determined. It is furthermore preferred for the d_{90} value of the particle size distribution of the microcapsules to be $< 70 \mu\text{m}$, preferably $< 60 \mu\text{m}$, particularly preferably $< 50 \mu\text{m}$. The d_{90} value of the particle size distribution is the value at which 90% of all particles are smaller and 10% of the particles are larger than this value.

[0067] The determination of the diameter of the capsules or the particle size of the microcapsules can be carried out by conventional methods. It can be determined, for example, with the aid of dynamic light scattering, which is usually carried out on dilute suspensions, for example containing 0.01 to 1 wt.-% capsules. Electron microscopy can be used as well.

[0068] Suitable materials for the capsule wall are usually high molecular weight compounds, in particular polymers or polymeric structures based on proteins (e.g., gelatin, albumin or casein), cellulose derivatives (e.g. methylcellulose, ethylcellulose, cellulose acetate, cellulose nitrate or carboxymethylcellulose), other carbohydrates as well as, synthetic polymers (e.g. polyacrylates, polyamides, polyethylene glycols, polyurethanes, melamines, or epoxy resins). For example, melamine-urea-formaldehyde resins or melamine-formaldehyde resins or urea-formaldehyde resins may be used as capsule wall materials.

[0069] The capsules can release the encapsulated perfumes via various mechanisms. For example, capsules can be used which have a mechanically stable capsule shell, but then due to one or more environmental influences, such as change in temperature or ionic strength or the pH of the surrounding medium, become permeable for the encapsulated perfumes. Also possible are stable capsule wall materials through which the at least one perfume can diffuse over time. The capsules may release the at least one perfume oil, preferably when the pH or ionic strength of the environment changes, as the temperature changes, upon exposure to light, through diffusion and/or under mechanical stress.

[0070] In one embodiment of the present invention, the capsules are friable, i.e., they can release entrapped perfumes due to mechanical stress such as friction, pressure, or shear stress breaking the shell of the capsules. In another embodiment, the capsule is thermally labile, that is, entrapped materials may be released when the capsules are exposed to a temperature of at least 70°C , preferably at least 60°C , more preferably at least 50°C , and most preferably at least 40°C .

[0071] In still further embodiments, the capsule may become permeable after exposure to radiation of a certain wavelength, preferably by the action of sunlight.

[0072] It is also possible that the above release mechanisms are combined, i.e. that the capsules are friable and at the same time thermally labile and/or unstable when exposed to radiation of a specific wavelength.

[0073] The capsules which can be used according to the invention are typically water-insoluble capsules.

[0074] Water-insolubility of the capsules has the advantage that they can survive washing, cleaning or other treatment applications and thus be able to dispense the at least one perfume oil only after the aqueous washing, cleaning or treatment process, such as for example, when drying by mere increase in temperature or by sunlight or in particular friction of the surface.

[0075] Particularly preferred are water-insoluble capsules which break by friction, the wall material preferably comprising melamine-formaldehyde resins, polyacrylates, polyurethanes, polyolefins, polyamides, polyureas, polyesters, polysaccharides, epoxy resins, silicone resins and/or polycondensation products of carbonyl compounds and compounds containing NH groups.

[0076] The term "frangible" or "friable" capsules refers, in particular, to those capsules which, when applied to a surface treated therewith (e.g. textile surface) adhere, can be opened or broken by mechanical rubbing or by pressure, so that a release of content results only as a result of mechanical action, for example when you dry yourself the hands with a towel on which such capsules are deposited. Preferred frangible capsules have average diameter d_{50} in the range of 1 to $100 \mu\text{m}$, preferably between 5 and $95 \mu\text{m}$, in particular between 10 and $90 \mu\text{m}$, e.g. between 10 and $80 \mu\text{m}$, for example between 15 and $40 \mu\text{m}$. The shell of the capsules enclosing the core or (filled) cavity preferably has an average thickness in the range between approximately 0.01 and $50 \mu\text{m}$, preferably between approximately $0.1 \mu\text{m}$ and approximately $30 \mu\text{m}$, in particular between approximately $0.5 \mu\text{m}$ and approximately $8 \mu\text{m}$ or about $5 \mu\text{m}$. Capsules are particularly easy to squeeze if they are within the ranges given above regarding the average diameter and the average thickness.

[0077] Microcapsules with capsule walls of melamine-formaldehyde resins are particularly suited because of their excellent impermeability and mechanical stability.

[0078] The microcapsule shell typically makes up 5 to 20 wt.-%, for example 8-15 wt.-%, of the total weight of the microcapsule, i.e. the remainder, for example 80 - 95 wt.-% or 85-92 wt.-%, are made up by the core, i.e. essentially the encapsulated agents, such as the perfume/fragrance compounds.

[0079] Methods for microcapsule formation are known and described, for example, in US 2003004226 A1, which is herewith incorporated by reference in its entirety.

[0080] According to a preferred embodiment of the invention, the aqueous composition according to the invention comprises water-insoluble microcapsules, preferably core-shell microcapsules, wherein the capsule walls optionally

comprise melamine-formaldehyde resins.

[0081] In addition to the at least one perfume oil, these microcapsules may contain further liquids, but also solids, for example in the form of dispersions, for example, very fine hydrophobic silica finely distributed in the at least one perfume oil.

[0082] In various embodiments of the invention, the capsules may comprise, in addition to the at least one perfume oil, at least one further benefit agent, such as fabric care agents. The term benefit agents includes, in particular, textile care agents such as softeners, water repellents and precipitants, bleaches, bleach activators, enzymes, silicone oils, anti-redeposition agents, optical brighteners, grayness inhibitors, anti-shrinkage agents, anti-crease agents, color transfer inhibitors, antimicrobial agents, germicides, fungicides, antioxidants, antistatic agents, ironing aids, swelling and anti-slip agents, UV absorbers, cationic polymers, hard surface treatment agents such as disinfectants, water and repellency impregnations, gloss enhancers or preventatives, water repellents or hydrophilizers, film formers, stabilizer, like alk(en)yl-sulfosuccinamates, skin care agents (e.g. vitamin E, natural oils, aloe vera extract, green tea extract, panthenol, plankton extract, vitamin C, urea and / or glycine) or bacteria-inhibiting agents.

[0083] The perfume microcapsules are typically provided in form of a dispersion of the microcapsules in a continuous phase, typically an aqueous solvent, in particular water. These compositions are referred to as microcapsule slurries and typically have a solid content (microcapsules) of 20 to 60 % by weight, preferably from 30 % by weight to 55 % by weight, more preferably from 40 % by weight to 50 % by weight, based on the total weight of the composition.

[0084] The microcapsule slurries and the aqueous compositions comprising the microcapsules prepared therefrom are preferably stable, i.e., show after prolonged storage periods of for example several days to weeks at usual temperatures in the range up to 40 ° C, for example 4 weeks at a temperature between > 0 and 40 ° C, no agglomeration, sedimentation and/or floating of the capsules or any other phase separation.

[0085] The aqueous compositions disclosed herein in the context of the inventive methods are for example prepared from microcapsule slurries. Typically, these microcapsule slurries are used in amounts of 30 to 80 wt.-%, for example 40 - 70 wt.-% or 45 to 60 or about 50 wt.-%, relative to the total weight of the aqueous composition. The remainder of the aqueous composition is then made up by water and, optionally, additional components, such as the pigments/dyes described herein among others.

[0086] In various embodiments, the aqueous composition preferably has a viscosity of from 50 to 5000 mPas, preferably from 100 to 3000 mPas (Brookfield rotational viscometer, spindle 2, 20 rpm).

[0087] Based on the amount of microcapsule slurry used, in various embodiments the aqueous composition has a microcapsule (solid) content of 5 to 50 % by weight, preferably 10 to 40 or 15 to 30 wt.-% based on the total weight of the composition, as described above. In exemplary embodiments, the microcapsule content may be 20 to 25 wt.-%. As the microcapsules typically contain about 80-90 wt.-% core material, i.e. essentially perfume, the perfume content of the aqueous composition is thus 4 to 45 wt.-%, typically 8 to 35 or 13 to 27 wt.-%.

[0088] During use of the textile material, for example in a textile washing step, such as an automatic washing machine, the perfume microcapsules are released into the wash liquor and typically deposit on the laundered fabrics/textiles to impart these with the desired perfuming properties.

Pigment

[0089] Suitable pigments are commercially available, preferred are dyeing agents for the textile industry.

[0090] The pigments used are preferably not reactive with the textile, which is washed in the washing machine. The pigments are preferably loosely adhered to the textile material, like the laundry sheet, so that the pigments are released into the washing water. However, as noted above, said pigments are non-reactive with the laundered textiles and thus are removed with the wash liquor/water.

[0091] The solution comprising the pigment may be printed in form of patterns, letters or other shapes onto the substrate. Examples are trademark or product names, floral or geometric patterns and the like. In such embodiments, the pigment may be printed separately from the microcapsules in a further step or the printed pigment solution/ink may be the microcapsule containing aqueous solution such that both are applied in the same step. As the pigment is typically released during use, it may serve as an indicator for a proper washing cycle.

[0092] In various embodiments the aqueous composition comprises from 0.0001 % by weight to 5 % by weight, preferably from 0.001 % by weight to 1 % by weight, more preferably from 0.01 % by weight to 0.5 % by weight, of at least one pigment, based on the total weight of the solution.

Further optional compounds

[0093] In various embodiments, the aqueous composition or dye scavenging textile material can further comprise at least one compound selected from surfactants, UV stabilizers, enzymes (including cellulase), binder, antifoaming agents or mixtures thereof. Suitable examples for these compounds are in general all compounds commonly used in laundry applications.

Application of the aqueous composition

[0094] The method according to the present invention preferably uses rotary screen printing in a rotary screen printing machine for providing the textile material, preferably the laundry sheet, with perfuming properties. Alternatively, flexo print or a foulard process can be used.

[0095] Rotary screen printing enables that the amount of the specific aqueous composition on the substrate after the coating can be controlled, so that it can be ensured that the amount is within a range of from 1 gsm (gram per square meter, which means 1 gram of the specific aqueous composition per square meter of the substrate) to 90 gsm. The amount is preferably within a range from 1 gsm to 50 gsm, especially from 5 gsm to 30 gsm. The amount of 1 gsm (based on a minimum content of 5 wt.-% perfume microcapsules) is necessary to obtain a sufficient load of perfume microcapsules on the laundry sheet that generate a perceivable scent experience to the user on textiles (if the microcapsule concentrations described herein are used), especially on cotton-based textiles.

[0096] The final amount of perfume microcapsules may, in various embodiments, range from about 1 to about 10 wt.-%, for example 2 to 8 wt.-% or 3 to 7 wt.-%, relative to the total weight of the dry textile material.

[0097] Rotary screen printing is commonly known to the skilled person in the field, a suitable method is for example disclosed in WO 2015/139865 A1 or EP 0879145 A1. Flexo printing and the Foulard process are commonly known by the skilled person in the field of printing technologies.

[0098] The application step in step (iii) of the inventive method is preferably performed at ambient temperature. Therefore, the temperature is preferably in a range of from 10 °C to 35 °C, especially from 15 °C to 25 °C, especially about 20 °C. Thus, no specific temperature profile is needed for the method according to the present invention. The aqueous composition is applied to the substrate at ambient temperature. Preferably, after the application step the obtained sheet is dried at room temperature, or 35°C or more, or at an elevated temperature of up to 120 °C.

[0099] The drying step is preferably performed in a second machine, being different from the printing machine.

[0100] The methods described herein for application of the aqueous composition comprising the perfume microcapsules and optionally the at least one pigment may be carried out using a textile substrate that has already been pre-treated with the dye scavengers, as described above. Alternatively, the treatment with the dye scavenger and the perfume microcapsules and, optionally, the pigment and further agents of interest as described herein, may be carried out using one aqueous solution. It is however preferred that the dye scavengers are applied in a separate, typically prior, treatment step, which is then followed by a step of applying the perfume microcapsules and, optionally the pigment/dye. Any further components may be applied together with the microcapsules or in another separate step either before or after application of the perfume microcapsules. Accordingly, in the methods of the invention, the provided substrate is a dye scavenging textile material as described herein.

[0101] The methods described herein provide a scented laundry sheet also having dye scavenging properties. Thus, such a sheet would address two specific problems occurring when washing colored clothes, especially clothes based on cotton based materials. Due to the color scavenging properties, no staining of clothes due to colors running into the wash liquor during laundry appears, resulting in a new and fresh appearance of the clothes. Due to the perfuming properties, a fresh and pleasant smell of clothes particularly after several wash cycles is obtained.

[0102] In a further aspect, the present application refers to a textile material, such as a dye scavenging textile material, for example in form of a laundry sheet, with perfuming properties, being obtainable by the method according to the present invention.

[0103] The absorption capacity is a process parameter relevant for the production of the sheet. The absorption capacity is defined as the amount of standard cationic solution, which is absorbed by a substrate of a certain size in a mentioned period of time. To determine the absorption capacity, an aqueous composition (7.1 %) of a standard cationic compound (GMAC) is prepared and a sheet is placed inside said solution. The amount of said aqueous composition absorbed by the sheet within a certain time range at room temperature is determined. The textile material/laundry sheet of the present invention preferably has a substrate with an absorption capacity of 2.5 g to 7 g per 277.5 cm² within an absorption time of 1.5 s to 5 s (seconds), preferably it has an absorption capacity of 2.5 g to 6 g per 277.5 cm² within an absorption time of 2 s to 4.5 s. The values refer to a sheet size of 277.5 cm², corresponding to a sheet with a size of 250 mm to 111 mm.

[0104] The laundry sheet of the present invention is strong and robust to be suitable for all washing machine types. Strength and robustness might be defined by the tensile strength. Tensile strength refers to the resilience of the sheet against ripping. The direction of tensile strength can be distinguished between machine direction (MD) and cross direction

(CD). When the laundry sheet is produced, the lengthwise direction (direction of production) is the machine direction. The direction rectangular thereto is the cross direction. Relevant is of course also the tensile strength in respect of moisture. Thus, the sheets should be robust and stable if wet - which means a sheet that is immersed for 10 seconds in water - as well as if dry - which means a sheet as can be obtained by a supplier.

[0105] Thus, the laundry sheet of the present invention has, if wet, preferably a tensile strength in machine direction (MD) from 200 N/m to 1400 N/m, preferably from 300 N/m to 1200 N/m, especially from 400 N/m to 1000 N/m or to 1200 N/m, especially preferred from 550 N/m to 850 N/m and/or in cross direction (CD) from 100 N/m to 1000 N/m, preferably from 250 N/m to 800 N/m, especially preferred from 350 N/m to 600 N/m.

[0106] Thus, the laundry sheet of the present invention has, if dry, preferably a tensile strength in machine direction (MD) from 1200 N/m to 2800 N/m, preferably from 1400 N/m to 2600 N/m, especially from 1600 N/m to 2400 N/m, especially preferred from 1800 N/m to 2200 N/m and/or in cross direction (CD) from 900 N/m to 2500 N/m, preferably from 1100 N/m to 2300 N/m, especially from 1300 N/m to 2100 N/m, especially preferred from 1500 N/m to 1900 N/m.

[0107] It has been found that respective tensile strengths enable stable and robust products which are at the same time flexible and permeable to washing liquor. At the same time, the feel is good so that consumers' requirements are also fulfilled here.

[0108] All values for tensile strength, wet and dry, as well as cross direction and machine direction, have been and can be determined using a standard testing machine from Zwick GmbH, Ulm, Germany. The tensile strength according to the present invention is determined according to ISO 9073-3 (of the year 1989).

[0109] The tensile strength in machine direction and cross direction is measured for wet as well as for dry states. It has been determined for the substrates prior to any coating and also after the coating. The mentioned tensile strengths are thus for the substrate itself and also for the sheet according to the present invention.

[0110] With respect to the look and feel of the sheet, the thickness of the sheet is preferably from 0.62 mm to 1.5 mm, preferably from 1.0 mm to 1.2 mm. The thickness is especially relevant for the question of permeability. Thicker sheets might not be permeable to washing liquor. Thinner sheets might not be robust enough. Especially in aggressive top loaders with spindles they may be destroyed. This would not lead to a reduced efficacy of the laundry sheet but to reduced approval by the consumer.

[0111] In a further aspect, the density of the substrate is preferably from 40 g/m² to 180 g/m², preferably from 50 g/m² to 150 g/m² or to 130 g/m², especially preferred from 55 g/m² to 120 g/m². This density is sufficient to provide a substrate to be coated/impregnated with a sufficient amount of the aqueous composition. At the same time, it is possible to apply a dye scavenging compound first and afterwards treat the resulting substrate with the aqueous composition. The density enables in this case a sufficient dye scavenging as well as a sufficient perfuming property of the sheet.

[0112] The density is determined according to ISO 9073-1 (of the year 1989) and is the density of the substrate prior to any coating. Such a density is preferred as respective sheets have an improved performance compared with other sheets. Especially if the sheets are not only scenting sheets, but further comprise a dye scavenging coating, they can absorb large amounts of dyes from the washing liquor in short times compared with other dye scavenging laundry sheets. At the same time, the sheets are still flexible and water permeable, so that the consumer will accept them and also add them to delicate textile fabrics such as microfiber fabrics or others.

Examples

General process:

[0113] Laundry sheets with a dimension of 250mm x 130mm (0.0325 sqm) were prepared according to the method of the present invention. The fiber was a 90 gsm (gsm = g/m²) hydroentanglement construction using lyocel fiber 1.3 dtex, 38 mm dull. The sheets were pre-treated with a dye scavenger, as described herein. The comparative example (color catcher sheet w/o encapsulated perfume but containing very small amounts of free perfume) was used as such. The sheet according to the invention was additionally treated with an aqueous composition according to the invention containing 20-23 wt.-% perfume microcapsules (provided as a slurry with 40-45 wt.-% perfume microcapsules) and small amounts of pigments (less than 0,1 wt.-% of a mixture of pigments). The amount of aqueous composition per sheet was selected such that the dosage of perfume microcapsules per sheet was 0,12 - 0,15 g/sheet (3,8-4,5 gsm) which equals 4 to 4,7 wt.-% relative to the total weight of the sheet. The application occurred via rotary screen printing.

[0114] The obtained sheets were separately tested in a Miele Softronic W1734 washing machine at 40°C with 1200 rpm (cotton cycle) and a water hardness of 12 °dH (german hardness) on 2.5 kg terry towels (30x30 cm) dosing 50 ml of a standard, unperfumed liquid laundry detergent.

[0115] The washed textiles were evaluated by perfume experts, ranking the perfume intensity (PI; 1 to 10, whereby 1 is odorless and 10 is very strong) and the boost effect (BE; 1 to 5, whereby 1 is no boost and 5 is a very strong boost) at several points in time.

	Perfume intensity (PI)			Boost Effect (BE)
	Product itself	Wet Laundry	Dry Laundry after 1 day	Boost Effect after 1 day
5	Color Catcher Sheet (w/o encapsulated perfume; comparative example)	6	1.8	1
	Color Catcher Sheet according to the invention	7.5	6.5	5.5
10	Fabric Finisher Standard (dosage 30 ml in last rinse; comparative example)	8	8	8
	Perfume Pearls Standard (dosage 18 g in main wash; comparative example)	9	9	8.5
				3.5

Claims

1. Dye scavenging textile material, preferably a nonwoven, woven or knitted fabric, a braided rope or ball, comprising, consisting essentially of or consisting of a water insoluble absorbent substrate comprising
 - (a) at least one dye scavenging compound;
 - (b) perfume microcapsules;
 - (c) optionally at least one pigment; and
 - (d) optionally at least one compound selected from surfactants, UV stabilizers, enzymes, binder, antifoaming agents or mixtures thereof.
2. Method of preparing a textile material, preferably a dye scavenging textile material, with scenting properties, comprising the steps:
 - (i) providing a water insoluble absorbent substrate,
 - (ii) providing at least one aqueous composition comprising from 5 % by weight to 50 % by weight, based on the total weight of the solution, of perfume microcapsules and optionally further comprising at least one pigment,
 - (iii) applying the aqueous composition onto the substrate, preferably such that the amount of the aqueous composition on the substrate after the coating is within a range from 1 gsm to 90 gsm.
3. The method according to claim 2, wherein the water insoluble absorbent substrate is a dye scavenging textile material.
4. The method according to claim 2 or 3, wherein the aqueous composition comprises
 - (a) from 30 % by weight to 80 % by weight of water; and/or
 - (b) from 5 % by weight to 50 % by weight perfume microcapsules; and/or
 - (c) from 0 % by weight to 5 % by weight of at least one pigment,
 based on the total weight of the solution.
5. The method according to any of claims 2 to 4, wherein the aqueous composition further comprises at least one compound selected from surfactants, UV stabilizers, enzymes, binder, antifoaming agents or mixtures thereof.
6. The method according to any of claims 2 to 5, wherein the substrate is a non-woven.
7. The method according to any of claims 2 to 6, wherein the substrate is cellulose or pulp fiber based non-woven.
8. The method according to any of claims 2 to 7, wherein the substrate has been pre-treated with a dye scavenging compound, preferably GMAC or precursor thereof, and optionally comprises said dye scavenging compound in an amount of 5 to 20, preferably 10 to 15 wt.-%, relative to the total weight of the substrate.
9. Textile material, preferably a dye scavenging textile material, obtainable according to the method of any one of

claims 2 to 8.

10. Textile material according to claim 1 or 9, comprising perfume microcapsules in an amount of 1 to 10 wt.-%, preferably 2 to 8 wt.-%, based on the total weight of the textile material.

11. The textile material of any one of claims 1, 9 and 10, comprising at least one dye scavenging compound, preferably GMAC or a precursor thereof, in an amount of 5 to 20 wt.-%, preferably 10 to 15 wt.-%, based on the total weight of the textile material.

12. The textile material of any one of claims 1 and 9 to 11, comprising at least one pigment, preferably in an amount of 0.01 wt.-% to 0.5 % wt.-%, based on the total weight of the textile material.

13. The textile material of any one of claims 1 and 9 to 12, wherein the textile material is a laundry sheet.

14. The textile material of any one of claims 1 and 9 to 13, wherein the pigment is printed in form of patterns, letters or other shapes onto the textile material.

15. Use of the dye scavenging textile material according to claims 1 and 9-14 for providing color protection and perfuming to a textile in a washing process.



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 Application Number
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